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The quest for policy-relevant sustainability data in central banking

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Executive summary

Modern societies face important sustainability issues, spanning economic and financial considerations as well as an increasing range of environmental, social and governance aspects. Sustainability is a broad, evolving and multidimensional concept, which can be typically defined as the capacity to satisfy the needs of current generations without compromising the ability of future generations to meet theirs. Its growing relevance nationally and globally has sharpened the demand for adequate data and measurement frameworks, going beyond traditional economic and financial indicators that are already well established in the current statistical apparatus.

The interest of many central banks for sustainability indicators has expanded over time to support their various responsibilities, from monetary policy and financial stability analysis to statistics, supervision, regulation, reserve management and payment oversight. As data users, they often rely on available information to inform their policies, in particular through environmental, social and governance (ESG) metrics. As data producers, they increasingly compile novel or experimental indicators related to sustainability, often as a complement to other statistical authorities that serve as the primary providers. Central banks' focus has been in particular on sustainable finance – that is, financial activities that improve the condition of the environment or society or governance practices – and green finance – which focuses on environment-related aspects specifically.

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Despite the active policy demand for better and more insights on sustainability, important information gaps persist. First, measuring sustainability is complex because it combines various quantitative and qualitative dimensions and trade-offs that evolve with social expectations, policy priorities and scientific advances. Second, assessing the sustainability of well-being calls for measuring a wide range of resources, ranging from economic to non-economic types of capital, such as human, social and natural. Third, information in this area is often incomplete, heterogeneous, insufficiently granular, difficult to compare, dependent on modelled estimates or costly to access. In practice, this requires increasingly sophisticated techniques to integrate innovative and various data sources and types, including text, imagery and geospatial information.

Addressing these issues requires further active efforts to improve the quality of sustainability statistics, especially in terms of relevance, availability and accessibility, reliability and comparability. First, the data should be relevant and "fit for purpose" to answer defined policy questions as well as other user demands. Second, availability and accessibility are key to supporting analysis in a timely, sufficiently granular and accessible way. Third, compiled indicators must be reliable and adhere to the widely recognised scientific and ethical standards guiding official statistics, not least to ensure their integrity, objectivity and independence. Fourth, while available data are often grounded on local and disparate frameworks, most sustainability issues have a global nature, calling for better cross-border comparability, including through harmonised concepts and indicators. Ultimately, this calls for supporting coordination among the various stakeholders involved as well as adequate governance mechanisms, leveraging the longstanding experience of central banks and official statisticians in adhering to high-quality information standards and providing actionable and evidence-based insights for policy.

Several international statistical initiatives are underway to promote harmonised collection and dissemination of sustainability indicators. Ambitious global work plans have already been designed, including the G20 Data Gaps Initiative (DGI), updates to key international statistical standards and, more broadly, the Sustainable Development Goals (SDGs) of the United Nations (UN). Additionally, progress will require expanding data collections, leveraging innovative data sources, types and techniques, implementing global information standards and, perhaps more significantly, allocating additional resources to support national and global statistical capacity. Central banks, along with other financial authorities and international organisations, will continue to play an important role in this agenda by helping to both produce and use sustainability data, helping to secure the provision of high-quality reference information to better inform policymakers and the public at large.

1. Introduction: the concept and measurement of sustainability

In recent decades, **there has been an increased focus on addressing a wide range of increasingly prominent sustainability issues**. These include poverty and food insecurity, social and health inequalities, climate change and biodiversity loss. While not new, such topics have been receiving pronounced and growing public attention in the wake of global and diverse crises, including the Great Financial Crisis of 2007–09, the Covid-19 pandemic and recurrent extreme climate-related events (IPCC (2023); Lawrence et al (2024)).

At the conceptual level, **sustainability can be defined as the capacity to satisfy the needs of today's population while ensuring that future generations can also satisfy theirs** (UN (2015); UN et al (2025)).[2] From this perspective, the current level of human well-being is sustainable if it can be maintained, or improved, in the future (Stiglitz et al (2009)). This assessment should be done based on economic, social and environmental considerations, with both a dynamic – from the present situation to the future – and holistic – encompassing both local and global levels as well as individuals and societies – perspective.

In practice, **measuring sustainability can be a complex task**. One approach is to assess the increase or preservation of the different types of resources that support well-being. This can be done, for example, by quantifying the evolution of the available stocks of economic, social (including institutional or governance aspects), human and natural capitals (Graph 1).[3] Such a measurement should be expressed in net terms, that is, accounting for asset depreciation (eg obsolescence effects) and depletion (ie reduced availability or exhaustion of finite resources). Ultimately, measuring sustainability calls for going beyond traditional economic indicators, which are already relatively well captured in the current statistical apparatus, to encompass the broader range of human and natural activities – a task that is arguably still in its infancy.

Below the surface, **measuring the various types of resources supporting well-being entails a number of difficulties**. First, it demands achieving coherence across various statistical frameworks, particularly between environmental, economic and social accounts, which deal with heterogeneous phenomena and are de facto often fragmented (MacFeely (2025)).[4] Second, the measurement of non-economic types of capital is much less developed, not least because of the difficulty of expressing them in monetary terms.[5] This reflects both conceptual – eg how to quantify the quality of institutions – as well as practical – eg what deflator to choose to value natural resources – challenges. Finally, while most produced assets can be renewed relatively rapidly to maintain or improve well-being over time, this can be much more difficult

[2] See the foundational definition of *sustainable development* introduced in the Brundtland Commission report as a process that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (UN WCED (1987)).

[3] This is indeed the approach recommended in the 2025 System of National Accounts (SNA), which applies the integrated framework of national accounts to the measurement of well-being and sustainability (see the newly introduced Chapter 2).

[4] This need for improved coherence, also highlighted by the recent methodological review of the concept of well-being in the 2025 SNA, suggests developing a comprehensive framework encompassing economic, social and environmental accounts. This could be done by integrating the SNA, the SEEA and the proposed system of population and social accounts (SPSA) into a new "system of systems" (Havinga (2022)) or by designing the SNA to become a System of National Economic Accounts (SNEA; Vanoli (2017)).

[5] The scope of the integrated framework of national accounts is delimited by so-called boundaries which may prevent the wider measurement and analysis of sustainability, especially related to non-economic capitals. A typical example is the measurement of some key natural resources – eg the atmosphere, biosphere – which are not subject to ownership or monetary assessment, hence excluded from the SNA (see Chapter 35 (UN et al (2025)).

for other resources – such as biodiversity and institutional factors – that can be irreversibly damaged or not easily regenerated.[6]

The above challenges highlight the need to approach the measurement of sustainability by looking beyond the "traditional" contribution of economic resources to well-being and focussing primarily on a better assessment of the roles played by human, social, institutional and natural capitals. In practice, **the concept of "sustainability-related" data** (or "sustainability data") **is thus commonly understood as a shortcut referring to the broad range of sustainability metrics (especially non-economic ones) captured by the ESG framework** (Box A).[7] Launched under the UN Global Compact in 2004, this framework aims to incorporate ESG factors into investment decisions (UNECE (2013, 2025a)). In turn, it has led to the development of internationally recognised principles and indicators of sustainable finance, defined as the financing of projects or activities that sustain or improve the condition of the environment or society or governance practices (IFC (2021a); UN et al (2025); OECD (2025)).[8] More specifically, following the Paris Agreement adopted at the 2015 UN Climate Change Conference (COP21; UNFCCC (2015)) and reflecting the increasing threat posed by climate change,[9] particular attention has been devoted to the environmental dimension of ESG finance, or "green finance" (OECD (2022); Noss et al (2024); Nefzi et al (2025)).

In practice, **the demand for reliable sustainability data, notably related to non-economic aspects, has been particularly important to support central bank decision-making**. Given both their micro- and macroeconomic impacts, ESG factors can affect the conduct of central banks' various functions, including monetary policy, reserve management, supervision, regulation and payment oversight. In particular, growing evidence on climate-related hazards has underscored the importance of making use of market information on sustainable – and especially green – finance to tackle the risks to the financial system stemming from physical and transition risks (NGFS (2026a)). Central banks have also been increasingly producing novel or experimental sets of ESG indicators, along with other statistical agencies, such as national statistical offices (NSOs) and international organisations.

However, persistent information gaps remain especially as regards non-economic sustainability data. First, there are acute methodological challenges, beginning with the still limited availability of harmonised taxonomies, vocabularies and classifications, which are essential for ensuring cross-border comparability (IFC (2021a)).[10] This makes the actual measurement of ESG factors particularly complex,

6 For example, the development of sound institutions or the strengthening of social setups will typically span several generations (Deaton (2013)), while the exhaustion of natural resources (or the accumulation of CO_2 in the atmosphere) has proved to be quasi-irreversible.

7 See in particular Annex V in the 2025 SNA, § A5.63.

8 The recent evolution of the international statistical manuals is also grounded on previous initiatives, such as the "Who Cares Wins" under the UN Global Compact in 2004 that eventually led to the Principles for Responsible Investment (PRI) in 2006, Principles for Sustainable Insurance (PSI) in 2012 and Principles for Responsible Banking (PRB) in 2019 (UN (2004), IFC WB (2004), UNEP (2025)).

9 The so-called Paris Agreement explicitly called for "making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development" (see article 2.c).

10 A recent survey showed that the leading obstacle reported by central banks is methodological – eg the absence of harmonised definitions and taxonomies (IFC (2021a)).

for example to estimate environmental constraints (Jansen et al (2024); Khanh Nam (2026)). Second, ESG data often originate from poorly standardised, unstructured or novel sources, such as entity-level corporate reports, financial market transactions, satellite imagery and geospatial information. Making sense out of this heterogeneous information requires careful assessment to integrate such micro, entity-level and often alternative data into the macro, comparable and (sufficiently) quality-assured statistics that policy requires.

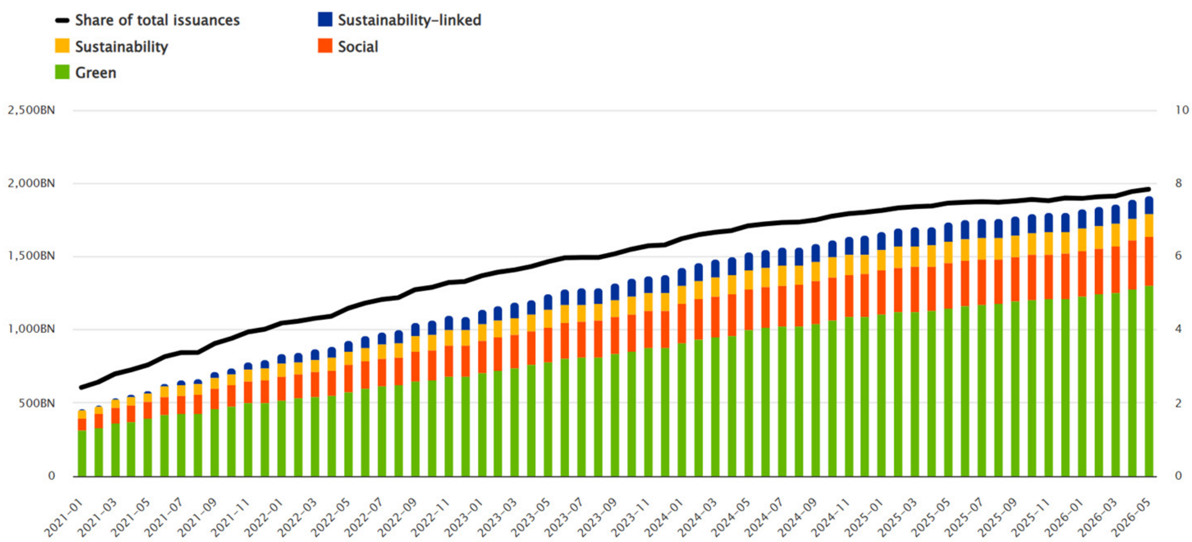
Major statistical initiatives are underway to address these gaps globally. One strand complements traditional, "GDP-type" indicators with broader measures of human development, such as the recommendations by the UN High-Level Expert Group (HLEG) on Beyond GDP covering well-being, equity and inclusion, sustainability and resilience (Graph 1; UN (2026)). A second strand relies on the updated core statistical standards, including the 2025 System of National Accounts (SNA) and the seventh edition of the Integrated Balance of Payments and International Investment Position Manual (BPM7) to promote a more integrated approach across environmental and economic accounts and introduce harmonised classifications for sustainable finance (UNSC (2024); Dilip et al (2026)). A third strand concerns corporate sustainability disclosures, for which the International Sustainability Standards Board (ISSB) standards and the recommendations by the Taskforce on Nature-related Financial Disclosures (TNFD) provide foundational inputs (IFRS Foundation (2026); TNFD (2023)).

The Beyond GDP dashboard — Graph 1

Source: UN (2026).

Another important milestone is the third phase of the G20 DGI (DGI-3), launched in 2022 with a five-year horizon (IMF et al (2023)) and actively supported by the central banking community. Its workplan – centred on people, planet and economy – aims to deliver actionable insights to better inform economic and financial policies, with 14 recommendations directly or indirectly related to the measurement of sustainability. Specifically, half of them focus on environmental issues spanning greenhouse gas emissions and national carbon footprint measurement; energy accounts; foreign direct investment (FDI) carbon footprints; climate finance [11] forward-looking physical and transition risk indicators; government climate-impacting subsidies; and climate change mitigation and adaptation expenditures. In addition, the DGI-3 also includes a number of socially relevant data gaps related to financial inclusion, income and wealth distribution. Overall, this workplan has supported significant methodological progress and triggered new global collections of sustainability-related data, for instance on the issuance of ESG securities (Graph 2).

Euro area issuances of sustainable debt securities – all levels of assurance — Graph 2



Left-hand scale: EUR, outstanding amounts at face value; right-hand scale: percentages. “Share of total issuances” refers to the amount of all sustainable securities as a share of all debt securities issued in the euro area.

Source: ECB Centralised Securities Database (CSDB).

Against this background, **the Irving Fisher Committee on Central Bank Statistics (IFC) of the Bank for International Settlements (BIS) and De Nederlandsche Bank co-organised “Sustainability data issues and central banks’ experience”** as a satellite seminar to the 65th World Statistics Congress (WSC) of the International Statistical Institute (ISI) in 2025. The event reviewed central banks’ production and use of sustainability data with a focus on ESG dimensions. It discussed the analytical contribution of sustainability information, the tools needed to unlock its value and the challenges it poses for statistics and policy, paying particular attention to: (i) environmental data; (ii) the relevance of other social and governance considerations for central bank activities; and (iii) the global statistical infrastructure needed to make these data policy-useful. This overview examines why data on sustainability that go beyond economic considerations matter for central banks

[11] The DGI-3 purposedly led to the setup of shared common definitions with the 2025 SNA regarding ESG and green financial instruments.

(Section 2) and sets out a quality framework along four dimensions, namely relevance, availability and accessibility, reliability and international comparability (Section 3).

2. Why broad sustainability dimensions can matter significantly for central banks

An input for central banks' responsibilities and activities

Central banks' interest in sustainability data beyond the "traditional" focus on economic development is both demand- and supply-driven. As users, they look for reliable sustainability-related metrics to support their analyses, with a primary focus on the consequences of climate- and nature-related events on the financial system (Gardes-Landolfini et al (2024)). They have been also looking for sustainability indicators beyond those related to climate and the environment, including to cover topics such as social resilience, governance factors and wealth and income effects in the population (Mehrotra and Yetman (2015); IFC (2021a); FSB (2024)). All these insights have proved relevant for many of their tasks, spanning the areas of monetary policy, financial stability, supervision, research, statistics, payments and portfolio management (Tan (2023); NGFS (2026a, 2026b, 2026c)). In practice, central banks often reuse and link the various types of data sources available, including official statistics produced by NSOs and international organisations, supervisory reports and payment and financial market data.

On the supply side, **central banks have also been increasingly producing novel indicators themselves, especially to assess sustainability-related impacts on financial institutions** (IFC (2021a)). This has typically been done as a complement to the information already available in the sustainability data ecosystem, and often on an exploratory basis[12] – for instance to monitor the development of sustainable finance and assess banks' climate-related risks. They have also actively contributed to the development of new statistical concepts, methods and sources to address previously unmet data needs in the sustainability area (Aurouet et al (2023)). A noteworthy case is the DGI-3 fourth recommendation, co-led by the BIS and European Central Bank (ECB), which is a testimony to the collaboration of central banks, NSOs and international organisations to count and classify sustainable financial instruments including debt securities and listed shares. Central banks have been also capitalising on their close synergies with financial stakeholders beyond the statistical community, including accountants, standard setters, regulators and supervisors, such as in the case of carbon content measurement (Alfieri et al (2024)).

12 NSOs' primary responsibility for collecting and disseminating sustainability-related indicators, including climate ones, reflects both their well-established role as coordinators of the national statistical system and their long-standing experience in the broad area of social, environmental, demographic and economic statistics (UNECE (2014, 2025b)). This prominence has been further strengthened in the context of the UN SDGs initiative; see the Cape Town Action Plan for Sustainable Development Data and the 2030 Agenda for Sustainable Development (UN (2015, 2017); UNSC (2017)).

Box A

Sustainability and sustainable finance: clarifying the link

Sustainable finance represents the full range of financial activities that aim to improve environmental, social and governance (ESG) factors. Specifically, environmental aspects include climate change mitigation and adaptation as well as broader issues related to the preservation of biodiversity, pollution prevention and reduced resource waste through the circular economy. Turning to social considerations, they refer to issues of inequality, inclusiveness, investment in people, their skills and communities, as well as human and labour rights issues. Furthermore, sustainable finance also encompasses the governance of public and private institutions, ranging from the degree of legal protection to corporate ethics, management and remuneration.①

This definition of sustainable finance has been incorporated in the 2025 SNA, which identifies two primary types ESG and green finance. Specifically, ESG finance comprises all financial "activities or projects that sustain or improve the condition of the environment or society or governance practices". Green finance, on the other hand, is a subset of ESG finance focusing on the "activities or projects that sustain or improve the condition of the environment", including climate-related ones.② Yet, in practice, the scope of sustainable finance taxonomies is often grounded on existing national metrics and may vary significantly across countries, depending on statistical frameworks and policy priorities.

The above considerations highlight that, while sustainable finance and sustainability are closely related concepts, they have a distinctive objective, scope and approach. First, sustainability is a development objective that encompasses a large breadth of considerations, including economic ones. The focus of sustainable or ESG finance is narrower as it deals with steering financial investments towards sustainable objectives. Second, and relatedly, ESG serves as operational enabler (or a *means*) for taking a broad range of well-being considerations when directing financial resources in specific areas ; by contrast, sustainability should be understood as a normative concept intended as an end in itself (or a *goal*), ie the preservation of human well-being. Third, sustainability has a holistic approach, spanning different levels together (local and global; individual and society). Sustainable finance, as captured through the ESG criteria, focuses on individual or units, such as entities or investment projects.

① For example, see the sustainable finance overview by the European Commission and OECD (2025). ② See paragraph 12.151 of the 2025 SNA.

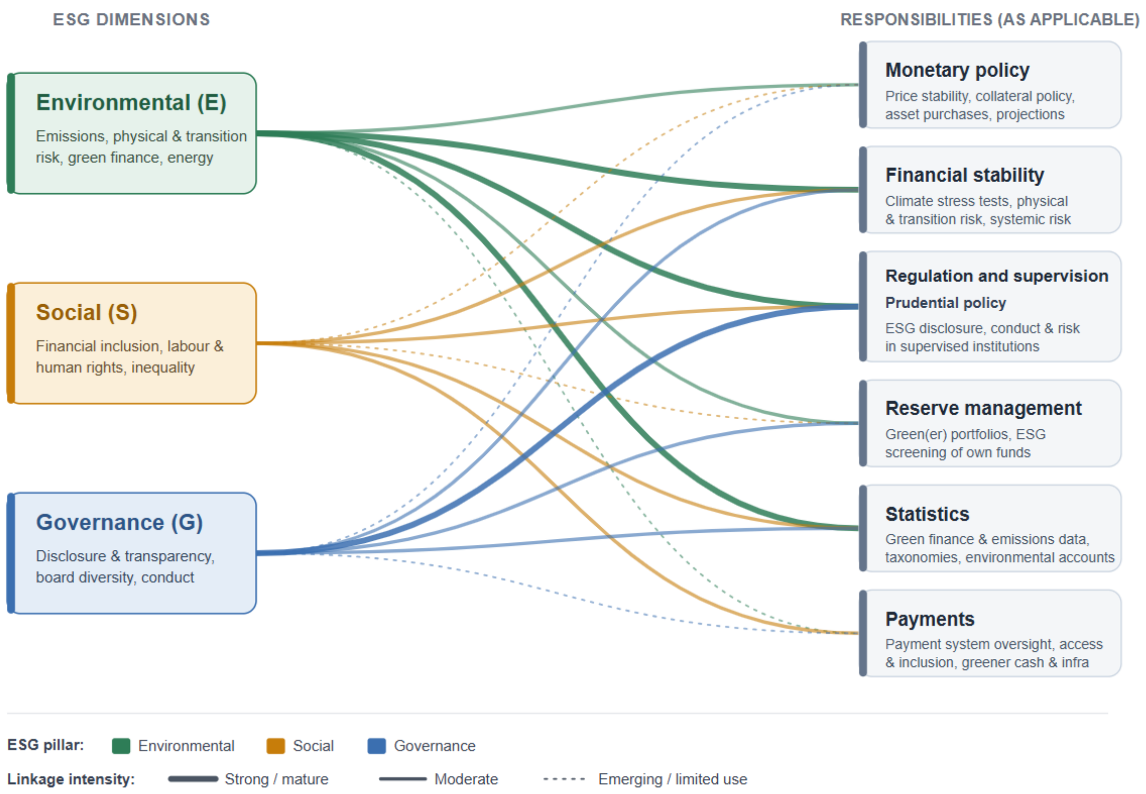
Climate-related data as a key focus

Among the wide range of sustainability issues, central banks have been primarily and closely monitoring the impact of climate change on the financial system in recent years. This impact can be divided into two categories (NGFS (2020)). First, physical-related aspects, such as extreme weather events or shifts in climate patterns, can disrupt macroeconomic variables, including productivity, supply chains, inflation and overall output. Second, transition-related impacts can affect market prices and output due to changes in policy, technological and/or social preferences. Typical effects include asset repricing, capital reallocation and the related distributional consequences across households, firms and sectors (NGFS (2024a)).

A key reason for central banks' attention to climate-related events is that they can affect financial and monetary stability through multiple and interconnected channels. First, they may alter credit quality, collateral values, market liquidity and risk premia, in turn generating broader monetary, financial and economic implications (Sleijpen (2025)). Second, and relatedly, they can pose financial stability risks, at the level both of individual entities, such as banks and insurers (eg climate stress tests and supervisory exercises; BCBS (2022)), and of the whole financial system (eg propagation of macro shocks and cross-border/sectoral spillovers; Bolton et al (2020)). Third, they are also relevant when making, implementing and assessing monetary policy, for example to adequately incorporate climate-related inflationary impacts, conduct liability-side operations (eg collateral frameworks, asset purchases, reserve management) or evaluate the effectiveness of monetary transmission mechanisms (NGFS (2026a, 2026d)). Fourth, climate- and nature-related data are also increasingly important for assessing central banks' own financial exposures (ECB (2025a)).

Fortunately, the supply of climate data available to central banks has increased steadily in recent years. Advances include publicly disseminated ESG bonds' categories and greater methodological harmonisation, for example in terms of classifications and definitions related to green finance (IFC (2025a)). As a result, environmental data gaps are arguably being closed faster than those related to social and governance indicators. This progress has clearly benefited from enhanced corporate disclosures, more precise emissions inventories and the development of integrated energy and environmental accounts as well as of novel data techniques to harvest non-traditional information sources. It has also been spurred by central banks' increasing demand for those indicators directly relevant for the assessment of the physical and transition risks posed by climate change (Graph 3).

Environmental aspects are particularly important ESG elements for central banks — Graph 3



Source: IFC (2021a).

As regards information sources, climate-related data used by central banks have proved to fall into four broad categories:

1. **Official statistics**, primarily derived from macroeconomic and environmental accounts that measure interactions between the economy and the environment (UN et al (2014)).[13] These are typically produced through structured statistical processes governed by well recognised rules and principles, and involve primarily NSOs, central banks, public environmental agencies and international organisations;
2. **Supranational databases on environmental risk indicators**, compiled by platforms that seek to centralise internationally standardised indicators to quantify climate and environmental risks on a best efforts basis. These data are typically made available on public portals and benefit from significant support by the global statistical community. One example is the EM-DAT international disaster database that contains long historical data on the occurrence and impacts of mass disasters worldwide. Other examples, focused on the European Union, include the Risk Data Hub (RDH) of the Disaster Risk Management Knowledge Centre (DRMKC), with information on environmental disasters' risk, damage and loss, and the AGRI4CAST Resources Portal, which combines meteorological data and crop statistics;
3. **Global public-private platforms providing sustainable finance and ESG information**. For instance, the Sustainable Stock Exchanges Initiative (SSEI) is a UN Partnership Programme that provides a global platform for exploring how exchanges can enhance performance on ESG issues, with access to various databases, for example on trading in carbon markets. Other examples include the various United Nations Environment Programme (UNEP) multi-stakeholder platforms, covering a wide range of issues, eg climate change, biodiversity loss or pollution, as well as those – often fee-paying – databases compiled by private data providers (eg issuance of sustainability bonds);
4. **Forward-looking climate scenarios**. These analytical frameworks explore how economies may evolve under different assumptions about environmental policy objectives and climate impacts, providing structured pathways for assessing physical and transition risk alternative trajectories. Such scenarios, developed by different bodies, including the Network for Greening the Financial System (NGFS; NGFS (2024b)) or the Organisation for Economic Co-operation and Development (OECD; OECD (2021)), are reported to be increasingly integrated into central banks' analytical toolkits.

Within this large universe of available climate-related data, **central banks' attention has focused on a relatively narrow set of indicators**, such as:

- Financial instruments and exposures related to climate finance (eg loans, securities, guarantees, collateral, portfolios);

[13] System of Environmental Economic Accounting (SEEA) accounts are compiled on a regular basis by almost 100 jurisdictions worldwide, yet with still limited coverage in regions such as Africa (UNSC (2026)). These macro statistics are often complemented by global databases, for example, on air emissions (by the OECD) and land use (by the Food and Agriculture Organisation (FAO)).

- Characteristics of counterparties and real economy activities (eg sectoral production, balance sheets);
- Wider ESG attributes and factors driving climate- and nature-related risks (eg carbon emissions, physical hazards/vulnerabilities, technology variables);
- Dynamic sustainability pathways (eg forward-looking scenarios, temporal objectives set by transition policies).

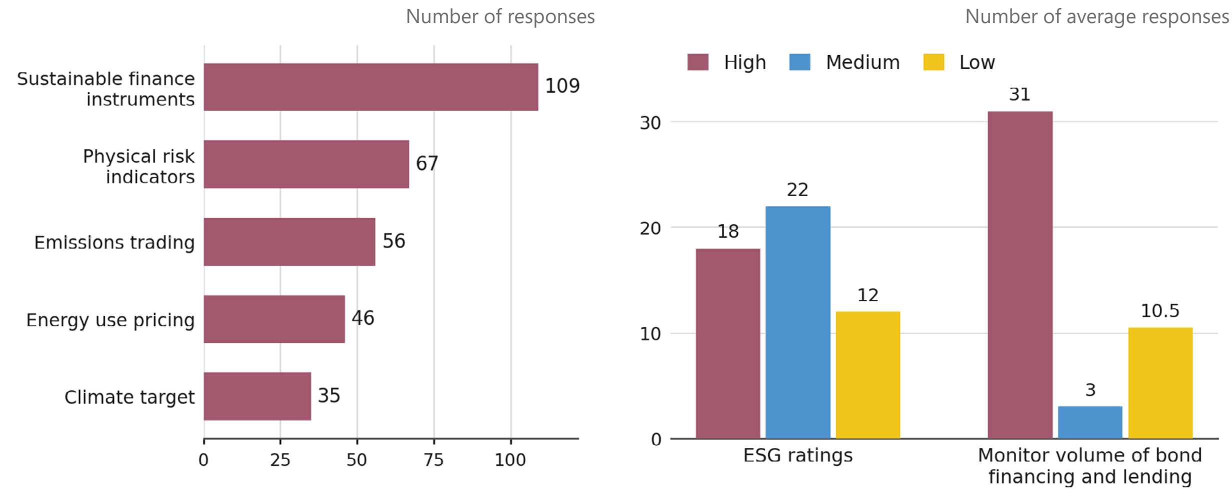
More specifically, **data on the issuance and holdings of sustainable financial instruments have been among the most widely used in the recent past**, followed by data on physical risks and emission trading (Graph 4, left-hand panel). In terms of priority, information to monitor the volume of sustainable bond financing and lending have usually ranked high (right-hand panel) among central banks, followed by ESG ratings. Important data gaps nevertheless remain, especially as regards the footprint of privately held firms, cross-border exposures, value-chain linkages and forward-looking measures (NGFS (2022)).

Central banks assign a very high priority to sustainable finance instruments to monitor financing aspects

Graph 4

Among the top environmental indicators, sustainable finance instruments rank highest…

…especially to monitor borrowing and lending activities



Source: IFC (2021a).

Integrating multiple and heterogeneous data

Given the breadth of sustainability data, linking information across sources, types and domains is essential for forming comprehensive, timely and actionable policy insights (Sirello and Tissot (2026)). As regards climate-related data, for instance, such integration often entails combining administrative, statistical and prudential sources to quantify financial institutions' exposures to physical risks (Arslanalp et al (2023)). It also mixes structured and unstructured data, including corporate reports and satellite imagery (Doll et al (2026)). More broadly, it requires embedding new ways of thinking into official statistical frameworks. For instance, spatial information cuts across domains and purposes in ways that traditional statistical processes may not always capture easily (UNECE (2026a)).

Compiling comprehensive sustainability data also depends on building adequate micro-macro linkages. Granular information collected for individual units, such as entities, persons or instruments, often provides the raw input for computing ESG indicators, drawing on registers, financial statements, instrument-level databases or alternative sources such as utility meter records measuring energy consumption. One challenge is the breadth and variety of the granular data universe that can be considered. For instance, market-based indicators, such as securities spreads, issuance patterns and liquidity conditions, should be monitored alongside real economy metrics to capture transition dynamics and financial amplification mechanisms. Likewise, micro-level financial exposure data must also be aligned with physical indicators, such as geospatial information, not least to assess distributional effects, risk scenarios and policy trade-offs (NGFS (2024a)). A last challenge is to have a sufficient degree of harmonisation, standardisation and comparability so that individual data can be usefully aggregated and combined with macro statistical frameworks that provide the "big picture", for example following well-established environmental-economic accounting standards.

Another issue is combining quantitative and qualitative information, especially for social and governance (SG) topics. As opposed to quantitative measures, often represented numerically, qualitative indicators are arguably harder to standardise as they may leave greater space for both multiple and subjective interpretations. This is especially true for SG indicators, which are more difficult to embed in policy toolkits in a standardised way. Yet, despite the lower attention paid to this information so far, SG considerations can also play a decisive role in shaping the resilience of the productive and financial systems as well as in influencing risk transmission channels. In particular, governance deficiencies can affect risk management, disclosure quality, conduct risk, operational resilience and supervisory assessments. Similarly, social aspects can be important when assessing macroeconomic resilience and the distributional effects of transition processes. In any case, SG indicators have already become relevant in specific central banking areas, including supervision, risk assessment and macro-financial surveillance – although their use in monetary policy operations and reserve management remains more limited than that of environmental data (IFC (2021a)).

Overall, integration requires data pipelines that can combine diverse information sources, types and levels of aggregation. Fortunately, advances in data processing and linkage, especially related to machine learning (ML) and artificial intelligence (AI), can already better support the processing and analysis of granular as well as unstructured information (IFC (2025b)). Integration also requires common data infrastructures that cut across statistical processes, supported by interdisciplinary skillsets and expertise in new domains, such as geosciences. Last but not least, enhancing cooperation between the various data stakeholders – including statistical agencies, international organisations, commercial providers, academia and citizens – appears essential to facilitate data-sharing while preserving confidentiality and data integrity (FSB (2023)).

3. A four-dimensional quality framework for sustainability data

Making further progress in addressing sustainability gaps is key to better inform central bank policies. In practice, improvements can be organised into four quality dimensions: (i) relevance and fitness for purpose; (ii) availability and accessibility, including adequate granularity, timeliness and completeness; (iii) reliability, based on sound concepts, transparent methods and robust production processes; and (iv) comparability, through greater harmonisation and consistency at national and global levels.

Advancing these four dimensions in parallel is essential for three reasons. First, quality shortcomings can limit the usefulness of sustainability information for policy purposes (Table 1). For example, inconsistent estimates of damages, transition costs and risk exposures may undermine forecasting, stress testing and surveillance exercises (Adrian et al (2022)). Second, standardised, open and verifiable data are necessary for securing the objectivity, trustworthiness and credibility of sustainability indicators and the policies they underpin. Third, existing sustainability data gaps are often the result of broader governance challenges, highlighting the need for better coordination frameworks and for making more global progress in terms of data collection, integration and interoperability.

Climate risk data gaps: four main dimensions — Table 1

Data dimension	Objective	Lessons from central banks' experience
Relevance	Ensuring fit for purpose information	✓ Clearly define policy purposes ✓ Identify relevant data for different objectives ✓ Balance benefits/costs in terms of informational value and administrative feasibility
Availability & accessibility	Improving coverage, access, granularity, timeliness	✓ Leverage both micro and macro data and integrate diverse sources ✓ Use innovative analytical tools ✓ Develop data-sharing agreements ✓ Prioritise pilot studies to address blind spots (eg FDI, SMEs), emerging market economies
Reliability	Ensuring the robustness of statistics produced	✓ Establish communication protocols for revisions ✓ Support the public foundation of sustainability datasets ✓ Expand identifiers and data standards (eg Legal Entity Identifier (LEI), the standard for Statistical Data and Metadata (SDMx))
Comparability	Enhancing national and international coordination	✓ Build harmonised global statistical infrastructure ✓ Coordinate internationally to standardise ESG data and methodologies ✓ Strengthen engagement among all stakeholders in the sustainability data ecosystem

Source: Authors' elaboration.

a. First focus point: relevance – making data fit for policy use

A key issue for central banks in addressing sustainability information gaps is to focus on producing the right data rather than merely collecting more. Prioritising quality over quantity fundamentally reflects the importance of relevance and fitness for purpose as essential properties of the data needed. Relevance ensures that information stays meaningful and closely aligned with the needs and contexts it is designed to address. Fitness for purpose, in turn, guarantees that the data are accessed, processed, shared and communicated to support their intended function effectively. Ensuring that these two properties are effectively met is key to keeping pace with constantly evolving scientific advancements, policy priorities and, ultimately, social expectations. Meanwhile, the appropriate use of the data collected requires careful and relentless attention to their design, origin and, perhaps more importantly, statistical quality and ethical standards (Dilip et al (2026)).

In this context, experience shows that **the value of information increases when users clearly specify *which* data are needed and *how* they can support central banks' activities related to sustainability**. These include analytical, statistical, policy and prudential tasks, such as risk monitoring, stress testing, scenario analysis and transition assessment. Operationally, this requires comprehensive, integrated and transparent statistical workflows that document, reconcile and balance trade-offs between input data and policy objectives.

A first starting point is documenting the relationships between sustainability factors and economic and financial outcomes relevant for policy. These can include developments in growth and inflation as well as financial stability conditions. One illustration is the assessment of the impact of heatwaves on economic output, which can vary significantly depending on regional characteristics, income distribution and the importance of the agricultural sector, as shown in a study conducted by the central banks of Germany, Luxembourg, Malta and Spain. Similarly, a recent analysis of bilateral FDI flows in France and Italy underscores how capital allocation can be sensitive not only to the geographic location and sector of the firms involved, but also to the type of climate risks they face. Moreover, as sustainable finance scales up, the links between cross-border positions and physical risk exposures are becoming more salient. This reinforces the need for adequate data to map international investment flows to hazard metrics, including to assess international spillovers and systemic vulnerabilities.

A second step is to adequately reconcile sustainability information across different levels of observation and, in turn, ensure its proper aggregation. For instance, climate-related financial exposures are often recorded at the entity level, whereas physical risks are frequently measured for specific spatial locations and assets. Moreover, the impact of transition risks on both tangible and intangible asset prices typically depends on national factors, such as country-specific technology pathways and policies, further complicating macro-micro linkages. In Belgium, for example, the national implementation of energy performance certificates is estimated to have contributed to a declining trend in house prices for those dwellings constrained by the new policy. At the same time, improvements in the quality of average houses sold, largely driven by greater energy efficiency, have contributed to higher aggregate values. Another example is the Bank of Italy's assessment of firms' nature-related financial risks using micro-level sources (Lavecchia et al (2022)). This requires combining granular environmental data (eg on households and non-financial corporations' energy consumption and building energy performance) with macro information, such as jurisdiction-level climate transition processes (Box B).

A third consideration is to **balance the value of additional sustainability data collections against associated costs**, including in terms of meaningfulness and reporting burden. There can be value in focusing on a limited yet policy-relevant set of indicators rather than collecting an excessive volume of heterogeneous and noisy data. For example, an increasing number of jurisdictions require more detailed corporate disclosures related to ESG factors, but the usefulness of this information may vary and should be carefully assessed (Elgg et al (2025)). A related illustration, based on large language model techniques, is the finding that the economic impact of sustainability reports by large European issuers can be relatively limited. From this perspective, greater clarity about the policy-relevance of the information collected is essential for prioritising data development efforts and mobilising (limited) resources for statistical compilation, especially in less developed economies. Data reporting frameworks should also be proportionate to firms' capacities, particularly for smaller enterprises, given the potentially broad scope of ESG issues.

Box B

Identifying sustainable data gaps: lessons from Italy

The Bank of Italy has undertaken a comprehensive three-step assessment of climate-related and environmental risk data gaps:

1. **Data requirements**: the study first mapped the information needed on firms' transition plans, net zero commitments, financial analyses and compliance with international, European and national regulations (including supervisory requirements);

2. **Availability mapping**: the exercise then identified which data exist and are accessible – including official statistics (eg Eurostat, European Environment Agency, national agencies, etc), risk indicators (eg European Commission Disaster Risk Management Knowledge Centre (DRMKC)), platforms (eg SSEI) and climate scenarios (eg those available on the NGFS scenarios portal) – versus what exists but remains inaccessible;

3. **Gap identification**: the review pinpointed critical missing data, especially at the micro level.

A key lesson from this assessment is that, while aggregate statistics and risk indicators are generally available, the micro data needed for precise transition risk assessments often remain siloed. In particular, data on household and corporate energy consumption (as available in the Sistema Informativo Integrato) and building energy performance certificates (in the Sistema Informativo sugli Attestati di Prestazione Energetica) exist, but access to them is limited due to privacy and legal constraints. Hence, unlocking these administrative data sets – with due consideration to legal and ethical standards – appears crucial to significantly improve both the macroeconomic monitoring of the climate transition process and micro-level financial risk measurement exercises.

Perhaps more fundamentally, the Bank of Italy experience underscores that addressing environmental data gaps is not only a technical challenge, but also a strategic and governance task requiring coordinated action among the various stakeholders involved, including statistical agencies, regulators, financial institutions and data providers.

b. Second focus point: enhancing data availability and accessibility, including through granularity and timeliness

Availability and accessibility

To be useful, sustainability data have to be made widely available and readily accessible. In practice, however, major gaps remain, especially for environmental data, with heterogeneity in terms of sectors, geographies and reporting institutions (Box C). Limitations include incomplete scope 3 corporate reporting, uneven ESG data for small and unlisted firms, inconsistent assurance of sustainable finance labels and difficulties in linking counterparties across data sets, not least because common identifiers remain incomplete (FSB (2023); IFRS Foundation (2026); TNFD (2023)).

Box C

Main shortcomings in environmental data used by central banks

Environmental data face persistent challenges in terms of relevance, availability, reliability and comparability, reflecting both governance and operational constraints.

For one, **robust data frameworks** require clear processes for governing the availability, accessibility and harmonisation of a wide range of fit-for-purpose indicators – spanning firms' exposures and transition plans, the carbon content of economic activities and climate scenarios underpinning forward-looking risk assessments (IFC (2025a)).

Turning to operational limitations, **important measurement difficulties remain**, for instance in properly assessing value chain exposures, financed emissions and cross-border activities. Furthermore, the information used still relies to a significant extent on assumptions and model estimates because of unobserved data points.

Against this background, a key lesson is that addressing environmental data gaps would call first for **improved reporting by firms**. Yet, despite progress in sustainability information corporate disclosures, significant shortcomings persist, including due to complex and/or too detailed reporting requirements, uneven auditing practices, limited comparability and the lack of harmonised international frameworks.

Another issue is the difficulty in **properly apprehending the various and complex interactions between nature-related factors and developments in the economy and the financial system**. One telling example relates to the role of FDI in amplifying or mitigating climate-related risks, which can differ depending on the sectoral composition and location of the investments made.

The importance of current data gaps has been reinforced by the growing demand for sustainability information at both national and global levels. As scientific discoveries advance and policy priorities evolve, data collection exercises need to adapt accordingly. This is particularly true for climate finance, which has been characterised by significant changes in financial instruments and funding structures in recent years. For example, the Central Bank of Malaysia has focused on the growing role of Islamic finance instruments (sukuk securities) in channelling funds for financing sustainable projects. This requires adequate information to assess market depth, measure issuance in a standardised way and evaluate the credibility of instruments labelled as sustainable – including by having reliable and transparent assurance level labels.

One way to address data availability issues is to **promote better sharing and governance**. Options include technical solutions, contractual agreements and legal frameworks to access and link confidential and/or non-public data sets, including registers (IFC (2025d)). Another avenue would be to improve methodologies for transparently tracing the diverse sources used to produce actionable information, such as textual corporate disclosures, geospatial and administrative records, and financial data. This calls for coordinated action among all relevant stakeholders – ie statistical agencies, regulators, financial institutions and data providers – in order to harmonise standards, improve data-sharing, and support the availability of robust sustainability indicators.

A second, related action point is to **develop comprehensive data inventories and directories**, for instance through collaborative platforms that make it possible to crowdsource, integrate and curate databases provided by various stakeholders. A telling example is the BIS/NGFS project data directory to provide central banks and financial supervisors with an overview of all climate risk-relevant data available globally. Experience shows that such directories can be valuable tools for identifying and addressing data coverage issues. Yet, to be successful, their development should be user-centric and agile, with the provision of advanced search and analytical capabilities.

A third solution is to **conduct targeted pilot studies, especially for data-poor segments such as FDI, small and medium-sized enterprises (SMEs) and emerging market economies** (Borga et al (2023); IFC (2024); Genre et al (2025)). Examples include the Bank of Korea's project to develop exploratory statistics from available micro-level information rather than launching broad new surveys, as well as a recent ECB pilot to measure the exposure of FDI to physical climate risks. Instead of linking aggregate country-level FDI flows to climate indicators, the latter approach decomposes FDI enterprises into elementary units, assesses physical risks at those locations and aggregates risk scores back to the FDI level. Similar initiatives have been used to overcome data gaps on carbon emissions (Box D). One notable lesson of these various examples is that targeted approaches can be particularly valuable because of their proportionality, as they limit reporting burdens while addressing critical blind spots.

A final focus point is to **leverage innovation to improve data accessibility** (IFC (2025c)). Even when sustainability data are potentially available, various technical constraints can make them difficult to access and/or process (Nefzi et al (2025a)). In particular, innovative data science techniques can help integrate novel and heterogeneous information sources – such as supervisory data, payment systems, private sector records and satellite imagery – and extract new signals – eg with the use of generative AI to support text-based analytics (Araujo et al (2026)). Innovation can thus help fill gaps where traditional ESG reporting is incomplete, for example by estimating location-specific physical risks, mapping firms' facilities or inferring exposure networks. Moreover, it can improve the timeliness and granularity of the information available to users, which are important requirements, as analysed below.

Box D

Overcoming data gaps on carbon emissions

Carbon emissions are a useful metric for central banks to inform their policies when dealing with climate-related issues. Yet data gaps in this area are persistent, facing a still limited yet increasing number of corporates disclosing their carbon emissions on a voluntary or, in some cases, regulatory basis (Olesiewicz et al (2021); Elgg et al (2025)).

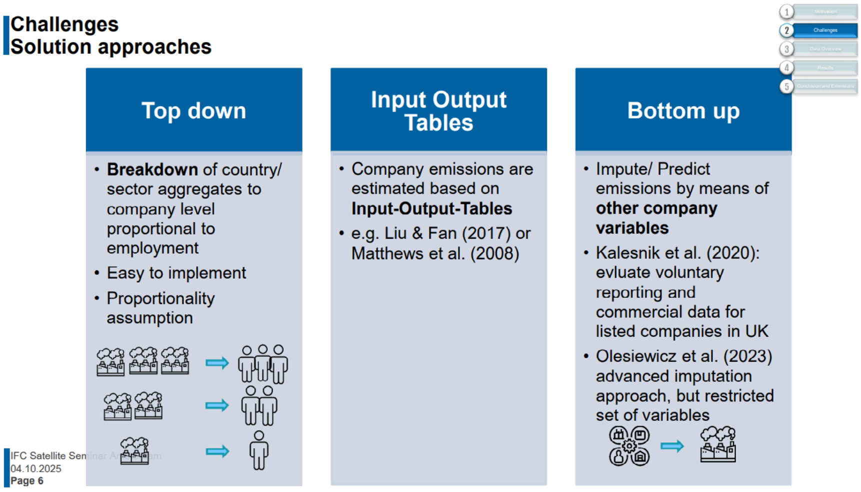
To overcome such gaps, central banks commonly apply three main estimation approaches (Graph D1):

- **Top-down approaches disaggregate aggregate figures to the firm level using proxy variables**. These methods allocate macro-level CO_2 emissions data – such as national or sectoral indicators – to individual firms based on their characteristics, for example in proportion to their labour force. While this approach is relatively straightforward and scalable, it can be imprecise when firms display heterogeneous technologies, energy mixes or value chain structures.
- **Input-output table-based approaches allocate emissions to firms depending on their position in sectoral value chains**. For example, global multi-regional input-output tables and national CO_2 emissions databases can be combined to calculate national and regional emissions as well as those embodied in value chains, using value-added accounts (Liu and Fan (2017)). One benefit of such methods is that they identify upstream and downstream linkages across value chains. But the quality of the results depends critically on the availability and reliability of both input-output tables and the mapping of firms to specific sectors.
- **Bottom-up approaches estimate emissions directly from firm-level information**. One recent example uses firms' balance sheets and income statements to estimate emissions depending on production factors and value added. However, these methods typically require substantial granular data and careful ex post validation.

Regardless of the method being used, the results should be compared and benchmarked against available and well tested statistics. One would also want to provide some breakdowns depending on the type of emissions (eg scope 1, 2 or 3), estimate uncertainty ranges and document the key assumptions being made.

Approaches to estimate missing CO_2 emissions

Graph D1



Source: S Walter (2026): "A comparative analysis of machine learning and classical statistical techniques for the imputation of corporate green house gas emissions", *IFC Bulletin*, no 68.

Granularity

Granular data have become increasingly important for supporting evidence-based policies in the ESG area, as aggregate statistics have often proved insufficient for effective risk monitoring of sustainability issues (IFC (2024)).

Drawing on their longstanding experience in working with micro-level information, **central banks have been actively contributing to the availability of more detailed sustainability indicators in recent years** (IFC (2021b); Brault et al (2024)). For example, the European System of Central Banks has introduced a series of climate-related financial sector statistics[14] comprising detailed information on banks' exposures to carbon-intensive sectors, securities issuance and holdings by green or transition label, borrower-level emission intensities and a detailed distribution of physical and transition risks (Aurouet et al (2023); Kanutin (2024)). This increasingly detailed statistical offering has been accompanied by methodological notes to support consistent compilation and usage.

Yet granular sources also pose operational, statistical and governance challenges. Operationally, they are often voluminous, weakly standardised and poorly interoperable, creating storage, processing and exchange difficulties. Statistically, unit-level observations may not fit directly with macro categories such as institutional sectors and may require dedicated quality management pipelines. Turning to governance aspects, micro data are often sensitive because records can identify individuals, firms or assets. This raises confidentiality risks and requires due diligence to ensure privacy protection and ethical data management.

Addressing these challenges calls in particular for further improvement in the global statistical infrastructure. First, the use of global and unique identifiers can be instrumental to improve standardisation. For example, initiatives such as the LEI can enhance transparency in ownership structures, in turn facilitating the mapping of corporate interlinkages and the quality of ESG group-level indicators (eg carbon emissions). Second, information standards, including the one from SDMx, can be instrumental to facilitate interoperability and integration (IFC (2025c)). Indeed, a key feature of SDMx is its versatility to handle the different data types underlying sustainability information, including geospatial and micro-level information. Lastly, collaboration among stakeholders in the data ecosystem is essential, not least to ensure comprehensive coverage of the information collected. For instance, there is an increasing need to complement bank-based sustainable finance indicators (eg green loans) with granular data on private credit. Collaboration is also key to foster micro data-sharing and interoperability, as experienced in Africa (OECD (2026)).

Timeliness

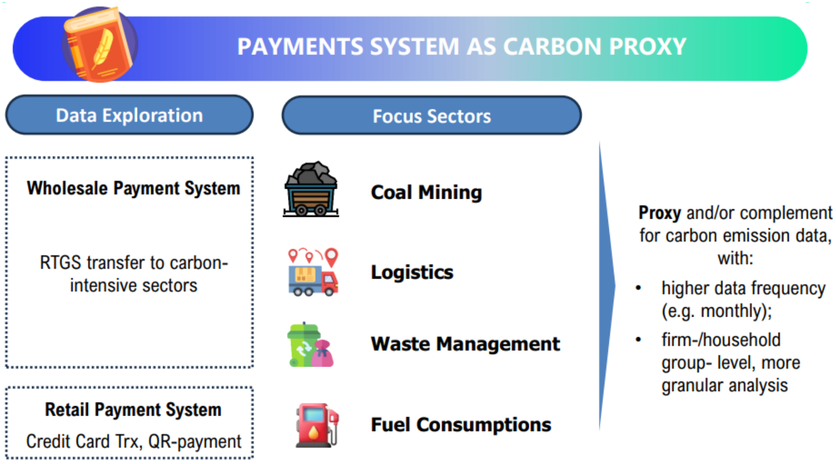
While users value timely sustainability data, many metrics are reported with significant lags. This problem is particularly acute for two reasons. First, ESG indicators feed into decisions that may require preventive action or fast reaction, including real-time monitoring of systemic risks (UNECE (2020)). Second, many of

[14] See the climate change-related indicators disseminated by the ECB.

them are new or experimental and therefore more volatile than regular statistics. Climate data, for instance, have faced significant discontinuities caused by changes in reporting concepts, structural breaks or sudden stops in data provision, especially by commercial platforms (Rössler et al (2019)).

Fortunately, innovative data sources and techniques can significantly improve timeliness in the ESG area. They can support more efficient and integrated collection processes, for example when sourcing unstructured information from sustainability reports. Moreover, modern techniques can help link primary and secondary data sources, even when their coverage differs substantially. Additionally, the growing toolbox of data analytics – including nowcasting, text mining and ML – can help provide timelier estimates, though this calls for careful quality checks and transparency on the methods used and the input data. For instance, nowcasting methods can combine historical carbon emissions from macro sources (often available with a significant lag) with higher-frequency proxies inferred from more timely corporate indicators, such as data on energy consumption or payments, as experienced by De Nederlandsche Bank in cooperation with the ECB. A similar approach, developed by Bank Indonesia, leverages high-frequency payment system data to estimate real-time carbon emissions associated with economic activity (Graph 5). In both cases, robust back-testing and transparent revision policies are essential to ensure that early estimates are consistent with the final data produced later.

Estimating emissions through high-frequency payment system data: the Indonesian experience — Graph 5



Source: R A Bimantoro, C Lim, M Khoyrul Hidayat, M Reza Ramadhan and A Ramadhan (2026): "Payment systems as carbon proxies: a novel big data analytics approach to measure the carbon content of economic activities", *IFC Bulletin*, no 68.

c. Third focus point: reliability – building trustworthy sustainability data

Reliability is essential for supporting well informed decision-making in a meaningful and trustworthy way. This quality dimension is particularly essential in the area of sustainability given the tight interdependencies of scientific, policy and social considerations. To be reliable, the information needs to be accurate, objective and impartial as well as complete, that is, containing all essential elements – including metadata – to enable its accurate interpretation. Experience suggests that the reliability of ESG data depends on three critical factors: integrity, transparency and a robust statistical production pipeline.

Integrity

To pursue integrity, **statistics need to be compiled following open, objective and impartial methodologies** in compliance with well established standards and ethical principles (UN (2014); ISI (2023)).

In practice, this requires **rigorous validation procedures following scientific standards**, for example to ensure that measurements are systematically grounded on solid evidence. It also demands transparent acknowledgement of both data and methodological limitations, accompanied by clear communication to users. A telling example is the quantification of uncertainty, for example of estimates generated by advanced – and often opaque and hard-to-understand – analytical techniques such as ML (UNECE (2026b)). Moreover, high-quality information should aim at the highest degree of objectivity to the extent possible. This is a particularly valid requirement – yet also a challenging one – for sustainability information, which is arguably more prone to subjective considerations compared with more traditional economic indicators (Conigliaro (2021)).

International benchmarking exercises can be another useful solution. One example relates to the finding that, in Korea, national sources suggested limited issuance of green finance instruments by domestic local high-emission industries, such as steel and chemicals, despite the growing need to finance the transition to low-carbon activities there. By comparing these data with the situation observed in Europe, the Bank of Korea was able to document that issuance by Korean firms comprises relatively fewer green bonds and more sustainability-linked bonds. Such benchmarking exercises have also been increasingly developed in the European context (ECB (2025b)).

Transparency

Transparency is instrumental to secure data reliability and trustworthiness. It greatly reduces the likelihood of having indicators based on opaque, unverified or unsubstantiated hypotheses or models as well as of providing a false sense of precision. This, in turn, can mitigate the risks of mis- or even disinformation, which would carry significant social costs (OECD (2024b)).

Enforcing and monitoring transparency is particularly important when dealing with ESG indicators, for at least two reasons. First, they encompass a large variety of data and concepts – from geospatial hazard layers to firm-level emissions inventories, national transition plans and social responsibility – for which applying different definitions or treatments could result in diverging insights (OECD (2025)). Second, ESG indicators have gained prominence in supporting the assessment and rating of corporate performance, which has important financial implications. Hence their compilation calls for responsible business conduct, due diligence, reliable and actionable assurance levels for auditing ESG statements and, broadly, transparency practices to prevent misleading behaviours such as greenwashing, especially when the data are self-reported (de Freitas Netto et al (2020); OECD (2023, 2024a); Elgg et al (2025)).

Against this setting, a number of actions appear necessary, starting with documenting data provenance. The dissemination of sustainability indicators should in particular be accompanied by systematic and transparent documentation about their origin (Viggo Sæbø et al (2020); Schubert (2025)). This is even more important as most these data make use of non-traditional sources which may be poorly documented yet widely available. This calls also for reinforcing feedback loops between alternative data providers and users of ESG information, both to improve the quality and consistency of new data sets and to adapt statistical compilation to evolving data needs. These challenges have been reinforced in recent years by the increasing use of innovative methods and novel information sources to bridge sustainability data gaps.

A second important focus point relates to documenting revisions, which can be large in a new area such as sustainability statistics, potentially limiting their usability and undermining public trust. Establishing transparent revision policies and clearly defined change protocols for communicating them to the users is therefore crucial. Such protocols should include procedures for notifying stakeholders about the degree of uncertainty involved and expected updates, clarifying the reasons for revision and providing detailed documentation as methods, sources and coverage evolve. Moreover, regular and structured communication channels can help users adapt to revisions while preserving confidence in the accuracy and relevance of the statistics produced. Such trust is a key element to maintain credibility in the statistical production chain, an issue of particular importance in the rapidly evolving, heterogeneous and complex ESG data ecosystem.

Robust statistical production pipelines

Reliable sustainability statistics require resilient data processes, including failure-proof infrastructure and business continuity arrangements. This calls for robust systems for data generation, storage, integration, access, analysis and dissemination. For example, given the multifaceted nature of ESG information, comprehensive, community-driven and multi-purpose open data platforms can be helpful to serve the various user needs effectively. As a case in point, the European Copernicus Climate Data Store provides harmonised data sets through a single interface for research and policy analysis. High-quality metadata are equally important for discoverability, trust and machine/AI readability. These efforts should sit within a comprehensive data governance framework, understood as a system of decision rights and accountabilities for data management (Križman and Tissot (2022); UNECE (2024)).

Well established data standards such as SDMx can facilitate these efforts. Its well structured information model can be a key enabler for metadata-driven processing, standardised statistical pipelines, stronger governance and operational efficiency. SDMx can also assist with innovative techniques, for example by supporting machine-readable formats while improving public access to documented and reliable data sets (IFC (2025c)).

A further priority concerns the statistical infrastructure itself. Better policy use of sustainability information requires improvements in data vocabularies, taxonomies and classifications, common entity identifiers, interoperable global registers, data-sharing arrangements and access to new information sources, including granular, geospatial and privately generated data. Developing more comprehensive and reliable forward-looking indicators is also key to inform scenario analysis, stress testing and transition planning. Lastly, the adequate use of innovation, including AI, can help improve coverage, timeliness and consistency, thereby facilitating central banks' use of ESG analyses across their various mandates.

d. Fourth focus point: comparability and global coordination

Because of their global nature, **sustainability issues need to be addressed comprehensively, requiring more comparable data across regions, sectors and jurisdictions**. Yet sustainability metrics have proved in practice to be highly dependent on local reporting specificities. Moreover, the lack of harmonised definitions across the various accounting and statistical frameworks will typically prevent temporal and/or spatial comparability, thereby further constraining analytical value. For instance, there are important differences in the taxonomies used across the world to define green financial instruments, making it difficult to assess the quality and consistency of the statistics produced (OECD (2020)). This diversity and the absence of commonly accepted global standards, especially as regards definitions of sustainable financial instruments and their assurance levels, may also facilitate a number of misleading practices, thereby further undermining the relevance and usefulness of the indicators being collected (Nefzi et al (2025b)).

Greater coordination among national and international stakeholders, including non-governmental, academic and private actors, can be essential to improve comparability. Enhanced cross-sector and cross-country comparisons would provide various benefits, including better informed policies, accelerated diffusion of good practices and data collection optimisation. It would also facilitate stronger engagement among official statisticians, economists, environmental scientists, technologists and market participants, in turn helping to improve data accuracy and the interpretation of compiled indicators.

Several global statistical initiatives are underway to improve the harmonised collection of sustainable statistics, particularly related to finance. The first stream relates to statistical concepts and definitions, building on the updates of key international statistical standards such as the 2025 SNA, BPM7 and the System of Environmental Economic Accounting Central Framework (SEEA CF). These manuals have, in particular, introduced clear statistical classifications, for example by defining "sustainability" breakdowns of financial instruments. A second avenue concerns the actual collection of sustainable indicators, especially under the third phase of the G20 DGI (IMF et al (2023)). A third focus point relates to the exchange of knowledge and best practices, including for central banks through platforms such as the NGFS or the activities of the IFC (Tissot (2022)). Lastly, the international community is actively supporting capacity-building across jurisdictions, by providing statistical technical assistance and fostering the development of adequate institutional settings.

Looking ahead, the quest for sustainability data could be advanced through a three-step action plan:

- First, **methodological frameworks should be strengthened**, building on global statistical initiatives already underway. The priority remains climate change data, but biodiversity, governance and social indicators should also be developed actively where concepts are sufficiently mature and data are available.
- Second, **the global statistical infrastructure should be upgraded to improve the usability of the wide range of sustainability data.** This calls for a renewed impetus for developing common standards, classifications, identifiers and registers as well as for integrating micro data and facilitating both the access to administrative and private data and their adequate sharing.
- Third, **data collections could be expanded gradually by leveraging those promising initiatives already developed across jurisdictions, including through the use of innovative data techniques and sources**. Success will depend on stronger global commitments and adequate resources, underscoring the importance of continued support from policy authorities.

References

Adrian, T, P Grippa, M Gross, V Haksar, I Krznar, C Lepore, F Lipinsky, H Oura, S Lamichhane and A Panagiotopoulos (2022): "Approaches to climate risk analysis in FSAPs", *IMF Staff Climate Note*, no 2022/005.

Alfieri, A, L Holloway, U von Kalckreuth, S Moll, C Schmieder and B Tissot (2024): "Empowering carbon accounting: from data to action", *IFC Report,* no 16.

Araujo, D, G Bruno, A Cap, J Marcucci, R Schmidt, O Sirello and B Tissot (2026): "Generative artificial intelligence in central banking", *IFC Bulletin*, no 67.

Arslanalp, S, K Kostial and G Quirós-Romero (eds) (2023): *Data for a greener world: a guide for practitioners and policymakers*, IMF.

Aurouet, D, A De Sanctis, D Giudice, J Franke, J Herzberg, M Osiewicz, R Peronaci and C Willeke (2023): "Indicators of granular exposures to climate-related physical risks for central banks' analytical purposes", in S Arslanalp, K Kostial and G Quirós-Romero (eds), *Data for a greener world: a guide for practitioners and policymakers*, IMF, Chapter 4.

Basel Committee on Banking Supervision (BCBS) (2022): *Principles for the effective management and supervision of climate-related financial risks*.

Bolton, P, M Després, L Pereira da Silva, F Samama, R Svartzman (2020): *The green swan – central banking and financial stability in the age of climate change*, BIS.

Borga, M, K Egesa, D Entaltsev, G Legoff, A Pegoue and A Sanchez Rodelgo (2023): "Measuring CO_2 emissions of foreign direct investment", in S Arslanalp, K Kostial and G Quirós-Romero (eds), *Data for a greener world: a guide for practitioners and policymakers*, IMF, Chapter 8.

Brault, J, M Haghighi and B Tissot (2024): "Granular data: new horizons and challenges for central banks", *IFC Bulletin*, no 61.

Conigliaro, P (2021): "Between social sustainability and subjective well-being", in *Social indicators research: an international and interdisciplinary journal of quality-of-life measurement*, Springer, vol 157, no 1.

Deaton, A (2013): *The great escape: health, wealth and the origins of inequality*, Princeton University Press.

de Freitas Netto, S, M Falcão Sobral, A Bezerra Ribeiro and G da Luz Soares (2020): "Concepts and forms of greenwashing: a systematic review", *Environmental Sciences Europe*, vol 32, no 19.

Dilip, A, Z Mdingi, O Sirello and B Tissot (2026): "The evolving role of central bank statistics", *IFC Bulletin*, no 66.

Doll, H, E Kormanyos, S Walter and G Alves Werb (2026): "The climate data iceberg – a depth of information to integrate", *IFC Bulletin*, no 66.

Elgg, D, T Park, O Sirello, B Tissot and J M Vidal Pastor (2025): "Leveraging corporate financial statements for policy insights", *IFC Bulletin*, no 65.

European Central Bank (ECB) (2025a): *Climate-related financial disclosures of the ECB's non-monetary portfolios*.

——— (2025b): "Climate change indicators: November 2025", statistical release.

Financial Stability Board (FSB) (2023): *FSB roadmap for addressing financial risks from climate change,* 2025 update.

——— (2024): *Stocktake on nature-related risks: supervisory and regulatory approaches and perspectives on financial risk*.

Gardes-Landolfini, C, W Oman, J Fraser, M Montes de Oca Leon and B Yao (2024): "Embedded in nature: nature-related economic and financial risks and policy considerations", *IMF Staff Climate Notes*, no 2024/002.

Genre, V, A Magniez, D Nefzi and F Robin (2025): "Measuring foreign direct investment carbon footprint: an experiment with macro data", *IFC Bulletin*, no 63.

Havinga, I (2022): "Towards a system of population and social accounts: building on past and current practices in social accounting, statistics and indicators", presentation at the UN Network of Economic Statisticians, Brussels, November.

Intergovernmental Panel on Climate Change (IPCC) (2023): *Sixth assessment report of the IPCC*.

International Finance Corporation World Bank Group (IFC WB) (2004): *Who cares wins, 2004–08*, no 1, no 113850.

International Financial Reporting Standards (IFRS) Foundation (2026): *IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information and IFRS S2 Climate-related Disclosures*.

International Monetary Fund (IMF), Inter-Agency Group on Economic and Financial Statistics and FSB Secretariat (2023): *G20 Data Gaps Initiative 3 workplan – people, planet, economy*.

International Statistical Institute (ISI) (2023): "Declaration on professional ethics", version endorsed by the ISI Executive Committee, Ottawa.

Irving Fisher Committee on Central Bank Statistics (IFC) (2021a): "Sustainable finance data for central banks", *IFC Report*, no 14.

——— (2021b): "Micro data for the macro world", *IFC Bulletin*, no 53.

——— (2024): "External statistics in a fragmented and uncertain world", *IFC Bulletin*, no 62.

——— (2025a): "Addressing climate change data needs: the global debate and central banks' contribution", *IFC Bulletin,* no 63.

——— (2025b): "Governance and implementation of artificial intelligence in central banks", *IFC Report,* no 18.

——— (2025c): "SDMX adoption and use of open source tools", *IFC Report*, no 17, February.

——— (2025d): "Data science in central banking: enhancing the access to and sharing of data", *IFC Bulletin*, no 64.

Jansen, A, R Wang, P Behrens and R Hoekstra (2024): "Beyond GDP: a review and conceptual framework for measuring sustainable and inclusive wellbeing", *The Lancet Planetary Health*, vol 8, no 9.

Kanutin, A (2024): "Improved data: how climate change impacts banks", *The ECB Blog*, 18 April.

Khanh Nam, P (2026): "The HLEG dual framing", presentation at a dialogue with experts from the Secretary-General's High-level Expert Group on Beyond GDP.

Križman, I and B Tissot (2022): "Data governance frameworks for official statistics and the integration of alternative sources", *Statistical Journal of the IAOS*, vol 38, no 3.

Lavecchia, L, J Appodia, P Cantatore, R Cappariello, S Di Virgilio, A Felettigh, A Giustini, V Guberti, D Liberati, G Meucci, S Piermattei, F Schimperna and K Specchia (2022): "Data and methods to assess climate-related and environmental risks in Italy" *Questioni di Economia e Finanza*, no 732.

Lawrence, M, T Homer-Dixon, S Janzwood, J Rockströ, O Renn and J F Donges (2024): "Global polycrisis: the causal mechanisms of crisis entanglement", *Global sustainability*, vol 7, no e6.

Liu, H and X Fan (2017): "Value-added-based accounting of CO_2 emissions: a multi-regional input-output approach", *Sustainability*, vol 9, no 12.

MacFeely, S (2025): "GDP and beyond: dilemmas and heresies", *Journal of Official Statistics*, vol 41, no 3.

Mehrotra, A and J Yetman (2015): "Financial inclusion – issues for central banks", *BIS Quarterly Review*, March.

Nefzi, D, J Noels, R Peronaci, C Schmieder, Ü Seven, Ö Seyhun, B Tissot and E Triebskorn (2025a): "Addressing climate change data needs: the global debate and central banks' contribution", *IFC Bulletin*, no 63.

——— (2025b): "Climate data needs: a primer for central banks", *SUERF Policy Briefs*, no 1175.

Network for Greening the Financial System (NGFS) (2020): "Overview of environmental risk analysis by financial institutions", *NGFS technical document*.

——— (2022): "Final report on bridging data gaps", *NGFS technical document*.

——— (2024a): "The green transition and the macroeconomy", *NGFS technical document*.

——— (2024b): *NGFS Climate Scenarios Technical Documentation*, V5.0.

——— (2026a): *Climate change and monetary policy strategy: a guide for central banks*.

——— (2026b): *Navigating nature-related data: metrics, sources and uses*.

——— (2026c): *Note on the economic and financial impacts of extreme weather events*.

——— (2026d): "Greening monetary policy operations", *NGFS technical note*, January.

Noss, J, V Songwe and J Yong (2024): "The rising tide of climate finance – scope to adjust prudential treatment", *FSI Occasional Papers*, no 23.

Olesiewicz, M, J Kooroshy and S Greven (2021): "Navigating the corporate disclosure gap: Modelling of missing not at random carbon data", paper presented at the Global Research Alliance for Sustainable Finance and Investment (GRASFI) Conference, Beijing.

Organisation for Economic Co-operation and Development (OECD) (2020): *Developing sustainable finance definitions and taxonomies, green finance and investment*.

——— (2021): "Forward-looking scenarios of climate finance provided and mobilised by developed countries in 2021-2025: Technical note", *Climate Finance and the USD 100 billion goal*.

——— (2022): "ESG ratings and climate transition: an assessment of the alignment of E pillar scores and metrics", *OECD business and finance policy papers*, no 6.

——— (2023): *OECD guidelines for multinational enterprises on responsible business conduct*.

——— (2024a): "OECD review on aligning finance with climate goals: assessing progress to net zero and preventing greenwashing", *Green Finance and Investment*.

——— (2024b): *Facts not fakes: tackling disinformation, strengthening information integrity*.

——— (2025): *Behind ESG ratings: unpacking sustainability metrics*.

——— (2026): *New data for Africa's changing climate: mapping risks, readiness and policy action*.

Rössler, O, A Fischer, H Huebener, D Maraun, R Benestad, P Christodoulides, P Soares, R Cardoso, C Pagé, H Kanamaru, F Kreinenkamp and D Vlachogiannis (2019): "Challenges to link climate change data provision and user needs: perspective from the cost-action value", *International Journal of Climatology*, vol 39, no 9.

Schubert, A (2025): "The eternal quest for quality in official statistics" in U Schipper, R Kirchner and J Walter (eds), *Measuring international economics*, Springer.

Sirello, O and B Tissot (2026): "Linking data for better evidence-based policy", *Data & Policy*, vol 8, no e28.

Sleijpen, O (2025): "Counting what's missing: building sustainability statistics in a data-scarce world", speech at the De Nederlandsche Bank, 4 October.

Stiglitz, J, A Sen and J-P Fitoussi (2009): *Report by the commission on the measurement of economic performance and social progress*.

Tan, B J (2023): "Central bank digital currency and financial inclusion", *IMF Working Paper*, no 69.

Taskforce on Nature-related Financial Disclosures (TNFD) (2023): *Recommendations of the Taskforce on Nature-related Financial Disclosures*.

Tissot, B (2022): "The central banking contribution to international statistics: A Basel perspective", *Statistical Journal of the IAOS*, vol 38, no 3.

United Nations (UN) (2004): *The Global Compact - who cares wins: connecting financial markets to a changing world*.

——— (2014): "Resolution adopted by the General Assembly on 29 January 2014: 68/261 – Fundamental Principles of Official Statistics".

——— (2015): *Transforming our world: the 2030 agenda for sustainable development*, A/RES/70/1.

——— (2017): *Work of the Statistical Commission pertaining to the 2030 Agenda for Sustainable Development*, resolution adopted by the General Assembly, A/RES/71/313.

——— (2026): *Counting what counts – A compass of progress for people and planet*, report of the Secretary General's independent High-Level Expert Group (HLEG) on Beyond GDP.

United Nations, European Commission, IMF, OECD and World Bank (2025): *System of National Accounts*, ST/ESA/STAT/SER.F/2/Rev.6.

United Nations, European Union, Food and Agriculture Organization of the United Nations, IMF, OECD and World Bank (2014): *System of Environmental Economic Accounting 2012* – Central Framework, ST/ESA/STAT/Ser.F/109.

United Nations Economic Commission for Europe (UNECE) (2013): "Framework and suggested indicators to measure sustainable development", report by the joint UNECE/Eurostat/OECD Task Force on measuring sustainable development.

——— (2014): Conference of European Statisticians recommendations on climate change-related statistics, ECE/CES/STAT/2014/2.

——— (2020): *In-depth review of the role of the statistical community in climate action*, Conference of European Statisticians, Sixty-eighth plenary session, ECE/CES/2020/21.

——— (2024): Data stewardship and the role of national statistical offices in the new data ecosystem, ECE/CES/STAT/2023/4.

——— (2025a): *Guidelines on measurement of well-being*, ECE/CES/STAT/2025/3.

——— (2025b): *Data for climate action: how national statistical offices can contribute*, ECE/CES/STAT/2024/4.

——— (2026a): *Embedding geospatial thinking into official statistics*, ECE/CES/2026/20, 74th plenary session of the Conference of European Statisticians, Geneva, 24-26 June.

——— (2026b): Uncertainty quantification in ML-enhanced statistical inference: a practitioner handbook with applications in official statistics, High-Level Group for the Modernisation of Official Statistics.

United Nations Environment Programme (UNEP) (2025): *Responsible banking: a six year journey of systemic change*.

United Nations Statistical Commission (UNSC) (2017): *Cape Town action plan for sustainable development data*.

——— (2024): *Report on the fifty-fifth session*.

——— (2026): "Results of the 2025 global assessment of environmental-economic accounting and supporting standards", Report prepared by the Committee on Experts on Environmental-Economic Accounting.

United Nations Framework Convention on Climate Change (UNFCCC) (2015): *Paris Agreement*, international treaty on climate change adopted at the UN Climate Change Conference (COP21).

Vanoli, A (2017): "The future of the SNA in a broad information system perspective", *The Review of Income and Wealth*, vol 63, no 2, November.

Viggo Sæbø, H, R Ragnarsøn and T Westvold (2020): “Official statistics as a safeguard against fake news”, *Statistical Journal of the IAOS*, vol 36, no 2.

World Commission on Environment and Development (WCED) (1987): *Our common future (the Brundtland Report)*, UN Digital Library System.