Investment Managers

June 2024

AXA IM ESG methodologies

ESG scoring, carbon & biodiversity footprint methodologies

Introduction

ESG integration as standard

Responsible investment (RI) has been part of AXA IM's DNA since its founding in 1994, with the first dedicated RI mandate dating back to 1998. As a leading actor in the financial services industry, AXA IM believes that responsible investments lead to value creation and that Environmental, Social and Governance (ESG) criteria have the potential to impact not only investment portfolios across asset classes, sectors, companies and regions but also a multitude of other client and stakeholder interests.

Leveraging its two decades of RI experience, AXA IM is integrating ESG analysis into all its investment platforms, providing fund managers with access to proprietary ESG scores and key performance indicators (KPIs) in their front office tools, as well as additional data and research.

RI expertise is embedded within investment and research teams, who are responsible for our RI-related activities and cover research, data/scoring, analytics, stock/credit analysis and active ownership/engagement. RI experts come from various background such as fund management, sell-side research, quantitative analysis, legal, coupled with relevant RI experience. This ensures the integration of RI issues with an investment-relevant approach.

Some of our strategies apply binding criteria in relation with the ESG scores, which are described in their legal documentation.

ESG research provides a complementary analysis to traditional financial research; these issues may have financial impacts for companies in the short and/or long-term time horizon.

AXA IM's conviction is that RI is a key driver of value creation. AXA IM has invested significant resources into building a team of experienced RI professionals who acts as a center of excellence, supporting the integration of ESG risks and opportunities in the investment processes of our investment platforms.

AXA IM ESG integration approach

Across all AXA IM business lines, the fund managers have access to ESG scores, research and Key Performance Indicators (KPIs) through their front office tools to ensure ESG risks and opportunities are incorporated into company analysis.

The fund managers have access to:

- ESG scores: they range from 0 to 10 for each ESG pillar across all AXA IM asset classes. These scores are then made available to portfolio managers and analysts across the company. RI specialists within the investment teams are also able to help portfolio managers and financial analysts in their understanding of the analysis of a company;
- Other ESG KPIs: Investment teams have access to a wide range of extra-financial data and analysis on ESG factors, across asset classes[1]. More specifically, a package of Environmental KPIs is available in the Front Office tool to allow the full understanding and analysis at issuer level. This leverages our relationship with providers such as MSCI, S&P Trucost, Beyond Ratings, and Reorg Findox. In this handbook, we notably provide information on our carbon & biodiversity footprint methodologies across our various asset classes (see sections II. & III.);
- Internal and external ESG research: internal ESG research focuses on themes related to climate change, biodiversity, gender equality and health. These analyses are supported by broker research, as well as regular meetings with companies, participation in conferences and industry events. The RI Research and Active Ownership team provides analysis training on sector-related issues, as well as controversies assessment;
- Trainings on key ESG issues and on engagement done by the RI experts through physical and technology-enabled sessions.

AXA IM is committed to reinforce ESG integration by continuously increasing the coverage in terms of asset classes, developing ESG research and data solutions available to investment teams and reinforcing its own internal research capabilities.

[1] We also disclose ESG Principal Adverse sustainability Impacts (PAI) under SFDR regulation for some EU legal entities and all our SFDR Article 8 and 9 financial products. More information are available on AXA IM website: Sustainable Finance | AXA IM Corporate (axa-im.com)

We believe an ESG scoring system is a necessary step to synthetize all material ESG information to further discriminate between thousands of issuers. It is also the starting point to assess the ESG quality of an issuer or of a portfolio relative to its benchmark or peers.

As of today, there is no market standard for ESG scoring and big players are still failing to address all dimensions. Using a model from a recognized external data provider completed by internal analysis appears a good way to add value to clients by bringing together best-of-breeds, giving a balanced view while mitigating providers biases, and preserving our issuer selection duty.

How are ESG KPIs used?

ESG KPIs & scores are an easy way to synthetize all material ESG information to then choose between thousands of issuers. It is the first step to assess the ESG quality of an issuer or of a portfolio relative to its benchmark or peers.

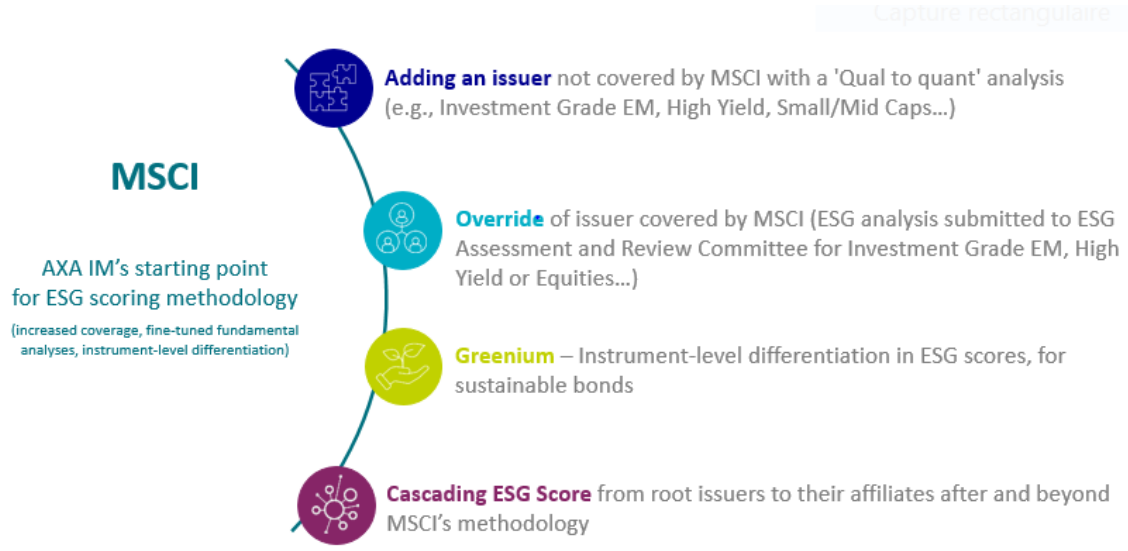
Thanks to these ESG KPIs & scores produced by the dedicated RI teams in AXA IM various business units, fund managers can assess how companies mitigate environmental, social and governance risks or use ESG dimension to improve their competitive position within their own sector. It allows every portfolio manager to identify the best ESG players and avoid the riskiest issuers regardless of their investment universe, while preserving portfolio diversification.

I. ESG scoring methodologies

Corporates scoring methodologies

ESG ratings for listed corporate assets

In 2021, AXA IM moved from a "blended score" which was an aggregation of KPIs from different providers to a structured scored called Q². Q² stands for Qual and Quant.



Source: AXA IM, 2023. For illustrative purpose only.

Using the MSCI ESG scoring model as the starting point, the Q² methodology allows to increase the coverage provided by MSCI as when MSCI doesn't provide a rating for an issuer, AXA IM ESG analysts can provide a documented, fundamental ESG analysis, which in turn will be transformed into a quantitative ESG score following MSCI pillars aggregation methodology and scores normalization, such coverage-enhancing ESG scores are referred to as "qual-to-quant". In 2022, we created 111 additional ESG scores based on a qualitative analysis, and 247 in 2021.

Second, when MSCI does cover an issuer but AXA IM's ESG analysts disagree with MSCI's ESG assessment (for example because the assessment is based on scarce and/or outdated data), a documented, fundamental ESG analysis can be submitted to the peer review of the ESG Assessment and Review Committee (ESARC), chaired by the Head of AXA IM Research; if the ESARC validates the analysis, it will be transformed into a quantitative ESG score and will override the existing, previously prevailing MSCI score. In 2022, 13 scores have been corrected through this ESARC process. Third, in the fixed income space, Q² will keep an instrument-level differentiation in ESG scores with a ESG score premium for sustainable bonds (green and social bonds) for which AXA IM's analysts (in RI Research) have a documented, fundamental positive or neutral opinion. Finally, AXA IM will keep "cascading" ESG scores from root issuer to its affiliates after and beyond what MSCI does in this respect.

MSCI scores are used as a starting point, for corporates and for sovereigns, which enables Q² to provide consistent ratings between the two asset classes. MSCI scores range from 0 to 10.

MSCI corporate ESG methodology covers more than 8700 companies by assessing thousands of data points across 35 Key issues, focusing on the intersection between a company's core business and the industry issues that can create significant risks and opportunities for the company. Companies are rated on a AAA-CCC scale relative to the standards and performance of their industry peers.

The 33 key issues are selected annually for each industry and weighted. MSCI ESG Ratings identify six to ten ESG Key Issues for each company. Environmental and Social Key Issues are industry-specific, and are determined based on the environmental or social

externalities that may generate unanticipated costs for a given company or industry. Governance (comprising of Corporate Governance and Corporate Behaviour) is assessed for all companies.

Key Issue weights are determined for each GICS® sub-industry based on the sub-industry's contribution to the negative externality associated with the issue and the expected time horizon for the issue to materialize.

3 Pillars	10 Themes	33 ESG Key Issues
Environmental	Climate Change	Carbon Emissions
		Climate Change Vulnerability
		Financing Environmental Impact
		Product Carbon Footprint
	Natural Capital	Biodiversity & Land Use
		Raw Material Sourcing
		Water Stress
	Pollution & Waste	Electronic Waste
		Packaging Material & Waste
		Toxic Emissions & Waste
	Environmental Opportunities	Opportunities in Clean Tech
		Opportunities in Green Building
		Opportunities in Renewable Energy
Social	Human Capital	Health & Safety
		Human Capital Development
		Labor Management
		Supply Chain Labor Standards
	Product Liability	Chemical Safety
		Consumer Financial Protection
		Privacy & Data Security
		Product Safety & Quality
		Responsible Investment
	Stakeholder Opposition	Community Relations
		Controversial Sourcing
	Social Opportunities	Access to Finance
		Access to Health Care
		Opportunities in Nutrition & Health
Governance	Corporate Governance	Board
		Pay
		Ownership & Control
		Accounting
	Corporate Behavior	Business Ethics
		Tax Transparency

Source: MSCI, 2023.

To arrive at a final ESG Rating, the weighted average of individual Key Issue Scores is normalized relative to ESG Rating Industry peers. After any committee-level overrides are factored in, each company's Final Industry-Adjusted Score corresponds to a rating between best (AAA) and worst (CCC). These assessments are not absolute but are explicitly intended to be interpreted relative to a company's industry peers.

Identified "key issues" are industry-specific environmental, social and governance externalities that may impact a company or industry. MSCI ESG Rating methodology identifies 33 key issues within the three ESG pillars (see on graph below) comprising 5-30% of the total ESG Rating:

- To arrive at a final ESG Rating, the weighted average of individual key issue scores is normalized relative to MSCI ESG Rating Industry peers;
- The weightings consider both the contribution of the industry, relative to all other industries, to the negative or positive impact on the environment or society; and the timeline within which we expect that risk or opportunity for companies in the industry to materialize;
- The framework is such that a key issue defined as "High Impact" and "Short-Term" would be weighted three times higher than a key issue defined as "Low Impact" and "Long-Term";
- Level of contribution to social or environmental externality: similar to the process outlined above, each GICS (Global Industry Classification Standards) Sub-Industry is assigned a "High", "Medium", or "Low" impact for each key issue based on MSCI analysis of relevant data (*e.g.*, average carbon emissions intensity);
- Expected time horizon of risk / opportunity: The time horizon of each key issue (Short-Term, Medium-Term, Long-Term) is classified based on the type of risk or opportunity that each key issue presents to companies;
- The Governance pillar weight has been determined assuming a "High Contribution/Long Term" and "Medium Contribution/Long Term" assessment on Corporate governance and Corporate behaviour respectively across all sub-industries. Additionally, the weight on the Governance pillar will be floored at a minimum value of 33%;

- The Risk exposure score and Risk management score are combined such that a higher level of exposure requires a higher level of demonstrated management capability in order to achieve the same overall key issue score;
- A controversy penalty if it is judged to pose material risks can be applied to the key issue score. A controversy case that is deemed to indicate structural problems that could pose future material risks for the company triggers a larger deduction from the key issue score than a controversy case that is deemed to be an important indicator of recent performance but not a clear signal of future material risk.

Lastly, the ESG Adjusted Score is mapped to a letter rating as follows:

Letter Rating	Leader/Laggard	Final Industry-Adjusted Company Score
AAA	Leader	8.571* - 10.0
AA	Leader	7.143 – 8.571
A	Average	5.714 – 7.143
BBB	Average	4.286 – 5.714
BB	Average	2.857 – 4.286
B	Laggard	1.429 – 2.857
CCC	Laggard	0.0 – 1.429

Source: MSCI, 2023.

If the Industry Minimum Score is greater than 4, it is truncated at 4, this could result in no companies in that industry receiving a CCC rating, whereas if the Industry Maximum Score is less than 6, it is truncated at 6, resulting in that no companies could receive a AAA rating.

Small and mid-caps corporates ESG rating

Since early 2023, we use an ESG rating provided by Reorg FinDox. It relies on 55 raw scores sourced from FinDox, all rated on a scale from 0 to 10 and classified as per the MSCI framework in 3 pillars, 10 themes and 35 key issues. The sectorial weighting also replicates MSCI's one[2]. This new expansion further allows the ESG coverage of the concerned financial products as well as the underlying investment universe to improve significantly.

Leverage loans and private debt ESG rating

Since early 2023, we rely on Reorg FinDox to provide us with ESG data on leveraged loan issuers. Data is then used to compute the ESG rating, based on our internal methodology. This specific ESG scoring methodology relies on the same framework as MSCI: 3 pillars, 10 themes and 35 key issues. The KPIs collected by FinDox on each issuer are mapped to MSCI's 35 key issues. Among the data collected by FinDox, we selected 55 KPIs to perform the ESG scoring with each answer to these KPIs rated on a scale from 0 to 10 based on our proprietary scoring model[3]. The final ESG score is computed as the weighted average of the pillars scores using the MSCI sectoral weights. The controversy level of the issuer is also evaluated by FinDox.

As ESG assessment is relatively new in this asset class, disclosure for some issuers is very low, therefore we add bonus/malus scores for a few important KPIs on which coverage remains limited. This penalty or reward also helps communicating to the loan market, the importance of looking at all these topics while it is at the start of these ESG considerations.

Green, social and sustainability bonds (GSSB) rating

A specific methodology for green, social and sustainability bonds (GSSB) has been designed to include the bonds' qualitative assessment made by the RI Research team into the Q² scoring frameworks. The scores rely on Bloomberg database and integrate Q² qualitative inputs, whether it is a corporate or sovereign bond, to produce an enhanced ESG score for GSSB issuances.

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[2] *Ibid.*

[3] Detailed list of indicators and criteria available upon request.

Thus, the scores given to these instruments are a combination of both quantitative and qualitative assessments. The ESG score of the bond can either be the same as its issuer or get a bonus depending on the qualitative assessment.

It allows us to differentiate these impact bonds from common bonds through ESG scoring and to favour investments participating in climate and social transition.

Sovereigns scoring methodologies

ESG ratings for sovereign assets

MSCI ESG Government Ratings covers 198 countries and regions and provides ratings on more than 99 percent of outstanding sovereign debt in the marketplace, and identifies 27 key issues for sovereigns within the three ESG pillars (see on graph below), and reflect how countries' exposure to and management of environmental, social, and governance risk factors may affect the long-term sustainability of their economies:

- The weight of an ESG pillar is determined after assessing the impact of that pillar on the long-term competitiveness over the short, medium and long term;
- Expected time horizon of risk / opportunity: time horizon of each key issue (Short-Term, Medium-Term, Long-Term) is classified based on the type of risk or opportunity that each key issue presents to the countries;
- The Governance pillar weight is assigned a higher weight (50%) than the Environmental and Social pillars (25%) as governance offers the most dynamic ways to influence the management of environmental, social and institutional risks;
- The Risk exposure score and Risk management score are combined such that a higher level of exposure requires a higher level of demonstrated management capability in order to achieve the same overall key issue score. Within this approach, a country's Government ESG score is constrained by its Risk management score.

Source: AXA IM, MSCI, 2023.

Agencies' scores

Selected government agencies with a similar risk profile to the sovereign entity are mapped to the Sovereign rating provided the issuer meets the following criteria:

- Agency is owned, guaranteed, or sponsored by rated sovereign entity;
- Agency does not fall into any of the following categories:
    - Utility;
    - Bank;
    - Industrial (e.g. Transportation, Energy, Consumer Services).

Agencies falling into any of these categories are subject to the IVA (corporate) rating approach and will not be mapped to the sovereign issuer's rating.

Supranationals' scores

Selected Supranationals classified as Supranational Administrative Bodies receive the weighted average scores and ratings of their underlying sovereign shareholders, weighted by the contribution or ownership of each sovereign to the underlying supranational. Unrated sovereigns contributing less than 5% to the overall entity are excluded from consideration.

Supranationals categorized as Multilateral Development Banks are subject to the IVA (corporate) rating approach and are not mapped to the underlying sovereign issuers' ratings, although country-level assessments are considered in the overall assessment of the institution alongside institution-level assessments of issues such as governance, transparency, accountability, and the environmental impact of financing.

KPIs

In addition to the ESG scores, we closely follow some KPIs corresponding to each E, S and G pillar. They are the ones that are indicated in the adjacent table. The data used for these KPIs either come from the World Bank, the World Economic Forum, or the World Health Organization.

E	Carbon intensity
	Energy intensity
	Water intensity
S	Government expenditure on education
	GINI index
	Healthy life expectancy
	Youth unemployment
G	Control of corruption
	Global competitiveness rank
	Political stability

Source: AXA IM, MSCI, 2023.

Issuance of an impact bond by a sovereign issue

The ESG score of an impact bond issued by a sovereign issuer is a combination of the country's ESG score and an opinion given by our RI analysts on the bond. They assess 4 pillars:

- The ESG quality and strategy of the issuer;

- The use of proceeds and the process for project selection;
- The management of proceeds;
- The impact reporting.

Depending on their assessment of these 4 pillars, the RI analysts will either give a positive, neutral or negative opinion on the bond. The bond will then be attributed a bonus on the pillar concerned (E for green bonds or S for social bonds) or on both the E and S pillars for sustainability bonds or will keep the issuer's ESG score if the opinion is negative.

Real assets scoring methodologies

Real estate direct property

The real estate direct property ESG rating is a proprietary tool, initially developed in 2016, in line with various sectoral benchmarks, such as building certifications (*e.g.*, BREEAM in use) and GRESB, to integrate the expectations of the AXA IM's main stakeholders and to guarantee the coherence of actions carried out at asset level.

First, a preliminary ESG score is calculated at the time of acquisition, noting that assumptions may be made as data availability can be limited.

Once under management, asset managers are responsible for undertaking an annual review and update the ESG score for the asset within our dedicated ESG data management platform. This assessment enables us to review the performance of an asset relative to AXA IM's portfolio at sector and country level, and establish short-, medium- and long-term action plans to improve their ESG performance.

Methodology

The ESG rating methodology for real estate assets has been developed around 3 pillars: Environmental (E), Social (S) and Governance (G), each covered by dedicated indicators. The assessment is linked to the performance of a building over a defined period. It uses actual consumption data collected by the property managers in the data management platform to measure energy (electricity, gas, district heating) and water consumption.

The ESG scoring has a total of 27 questions, 25 of which are scored, for a total of 200 points. The final score is calculated out of 10. In line with AXA IM Alts' ESG strategy, environmental criteria play a predominant role in the rating, representing 60% of the total score. Social and governance criteria represent an equivalent weighting of 20% each. Some themes have also been added in 2021 (*e.g.*, climate resilience, impact on local communities, biodiversity), to reflect the growing importance of these themes in AXA IM Alts' sector benchmarks and stakeholder expectations (see table below).

For new acquisitions, the methodology has been slightly adapted to the transaction context: compared to the methodology for standing assets, 5 questions have been modified to better fit acquisition context and data available, and 8 questions have been removed since not applicable to the acquisition stage/context, leading to a total of 17 rated questions. Overall balance and weight between categories have been maintained. The assessment is performed as part of the due diligence phase, using the results of the technical analysis performed to assess the building parameters.

Scope

All properties under direct management by the real estate asset management team within AXA IM Alts are subject to an ESG score at the time of acquisition and while under management (parking, plot of land and assets under development are out of scope).

The rating has been developed to address the specificities of all real estate asset classes (residential, office, hotel, etc.) and their geographic locations, and considers all uses per asset, beyond the data and information for which AXA IM Alts, which encompasses the activities of AXA REIM SGP SA, exercises control.

OBJECTIVE: Assess the real performance of the building					
Category		#	Question	New topics	Points / 200
ENVIRONMENT	ENERGY	1	What is the level of this building of the local energy performance scheme?		12
		2	Is energy consumption data collected automatically and regularly?		5
		3	What is the annual final energy consumption of the whole building?		12
		4	Which energy efficiency measures are implemented on the building?		12
	CARBON	5	Is the building's electricity consumption provided by renewable energy sources?	NEW	5
		6	What is the energy source of heating the building?		5
		7	Have you set an greenhouse gas emissions reduction plan to align the asset's GHG emission intensity with the CRREM 1.5°C trajectory?	NEW	12
		8	Does the building enable the use of low carbon transport?		12
	WATER	9	How has the annual water consumption of the building evolved?		8
		10	Which measures are in place to reduce water consumption in the building?		10
	WASTE	11	Is the amount of waste produced in the building recorded and uploaded to Deepki?	NEW	4
		12	Are a waste sorting facility or a waste recovery or recycling contract in place in the building?		4
		13	Which measures are in place to optimize waste management?	NEW	4
	BIODIVERSITY	14	What % of the site area is vegetated?		Not assessed
	CERTIFICATION	15	Does the building have a valid third-party independent sustainability certification?		15
		15b	Have other environmental certifications been obtained for your building?	NEW	Not assessed
SOCIAL	COMFORT AND WELL BEING	16	Which measures are in place to evaluate the comfort and wellbeing of the tenants?	NEW	5
		17	Which measures are in place to improve the comfort and wellbeing of the tenants?	NEW	10
	ENGAGEMENT	18	Are ESG clauses (or green lease) included in the building's lease contracts?	NEW	10
		19	Which measures are in place to engage with the tenants?		5
		20	Which measures are in place to contribute to the social and economic development of the local community?	NEW	10
GOVERNANCE	ACTION PLAN	21	Is there an action plan in place to improve the ESG performance of the building?	NEW	10
	RESPONSIBLE PROCUREMENT	22	Is there an RFP process in place for all service providers operating on the asset?		5
		23	Are sustainability clauses included in contracts with service providers?		10
	CLIMATE RESILIENCE	24	Is the building significantly exposed to a physical risks linked to natural catastrophes and climate change?	NEW	5
		25a	Are risk management measures in place to adapt to the impacts of natural catastrophes and climate change?	NEW	5
		25b	Are measures in place to adapt to the impacts of climate change?	NEW	5

Source: AXA IM, 2022.

Commercial real estate (CRE) debt

Non-financial criteria are taken into consideration during the due diligence and investment committee process at the time of acquisition. A scoring methodology specific to the asset class was developed in 2016 for the purpose of providing an ESG score to all portfolios' underlying assets.

In 2023, the CRE debt ESG rating tool was enhanced to reflect the changing risks and take into consideration the most relevant ESG indicators for the asset class. The enhanced ESG rating methodology aims at helping the portfolio management team with investment selection while serving simultaneously as a data collection and a progress monitoring tool for the loans that are held in portfolio.

The CRE debt ESG rating tool emulates the approach in place on the real estate equity side, analysing key environmental and social criteria and KPIs of the underlying real estate assets to determine relative ESG performance at the assets and project level. It is carried out using answers provided by the loan sponsor, the ultimate owner of the underlying asset, to a comprehensive ESG survey that is sent to them pre-investment and on an annual basis. Analysts are however encouraged to challenge that information whenever possible based on available data. Please bear in mind that sometimes assumptions are made, and proxy data used to circumvent data scarcity at the underlying asset level.

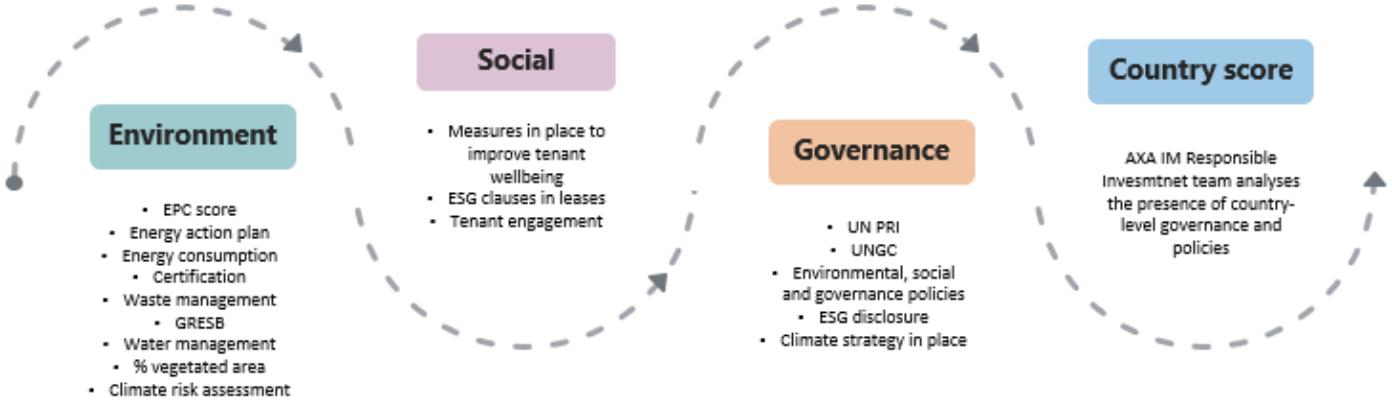
The enhanced ESG rating tool has a total of 22 indicators 4 (up from 14 in the previous iteration); 16 mandatory criteria are assessed at the asset level and 6 at loan sponsor level to rate investments on a scale from 0 (worst) to 10 (best). Additionally, nine optional criteria are covered in the ESG survey to capture project's credentials on more challenging ESG topics such as building's decarbonization strategy alignment with CREEM pathways or assets' contribution to biodiversity loss for instance. Each mandatory indicator has a list of possible responses allowing us to determine a score.

Due to the nature of the asset class (*i.e.*, debt) and the standard holding period (3-5 years on average), there are limitations as to the ability to effect meaningful change in the underlying asset ESG performance. However, to actively manage the level of underlying

[4] Detailed list of indicators and criteria available upon request.

assets sustainability risk within the CRE debt portfolio, the investment teams adjust the ESG scoring annually for any improvement or deterioration in the project or sponsor ESG credentials.

If such sustainability risks materialize in respect of any investment, they may have a negative impact on the financial performance of the relevant investment. AXA IM does not guarantee that the investments are not subject to sustainability risks to any extent and there is no assurance that the sustainability risks assessment will be successful at capturing all sustainability risks at any point in time. Investors should be aware that the assessment of the impact of sustainability risks on the performance is difficult to predict and is subject to inherent limitations such as the availability and quality of the data.



Source: AXA IM, 2023.

Infrastructure debt ESG rating

A proprietary ESG risk rating methodology specific to Infrastructure Debt portfolio underlying investments was developed in 2017 for the purpose of providing an ESG risk assessment to all projects financed during the due diligence phase. The rating was enhanced in 2023 to better align with best market standards and extend the consideration of extra-financial criteria to the full investment cycle, from the investment universe' screening to the due diligence phase, all throughout the holding period.

It is a tool developed by AXA IM to integrate material ESG factors relevant to infrastructure debt investors and aligned with well-established frameworks such as CBI Taxonomy, EU Taxonomy, SFDR, UN SDG, GRI, ICMA, TCFD and SASB.

It has been constructed around 3 pillars: Environment (E), Social (S) and Governance (G), each covered by dedicated factors and indicators. The rating asks borrowers 18 questions that thoroughly assess ESG risk exposure and evolution throughout the investment cycle and align with the reporting requirements under SFDR and Article 29 disclosure regulation (PAIs, including carbon emissions, etc.).

Additionally, the ESG rating methodology provides a solid basis to compare the ESG credentials of a wide range of investments across different infrastructure sectors, as well as deeper insights into each investment's idiosyncratic ESG risks.

Source: AXA IM, 2023.

To assess the environmental and social score of the transactions, our investment teams will take into account:

- Activity's alignment with the Climate Bonds Initiative;
- Alignment with environmental-related Sustainable Development Goals;
- Disclosure of environmental KPIs (e.g., annual GHG emissions emitted);
- Environmental risk assessments performed;
- The publication of an ESG/environmental report;
- Specific covenants related to environmental matters;
- Participation to GRESB;
- Environmental risks and opportunities aligned with the Climate Bonds Initiative (CBI);
- Environmental & Social risks and opportunities via alignment with UN SDGs;
- Disclosure of social KPIs;
- Provision of services to underserved populations;
- Specific health and safety risks.

To complement the project E and S performance, indicators for the S and G components also consider the following for the project shareholders:

- Public charter engagement (UN PRI signatory, UNGC signatory);
- Compliance analysis (KYC and AML screening, World Check database screening);
- Governance policies in place for human rights, including labor rights, bribery/corruption, taxation, and fair competition;
- Environmental and/or social policy;
- Participation in ESG initiatives (IPFA/LTIIA/GII);
- Commitment towards Net Zero.

These indicators help to determine the overall ESG score of the project which serve as informative indicators of underlying ESG performance and sustainability risk.

Infrastructure equity ESG rating

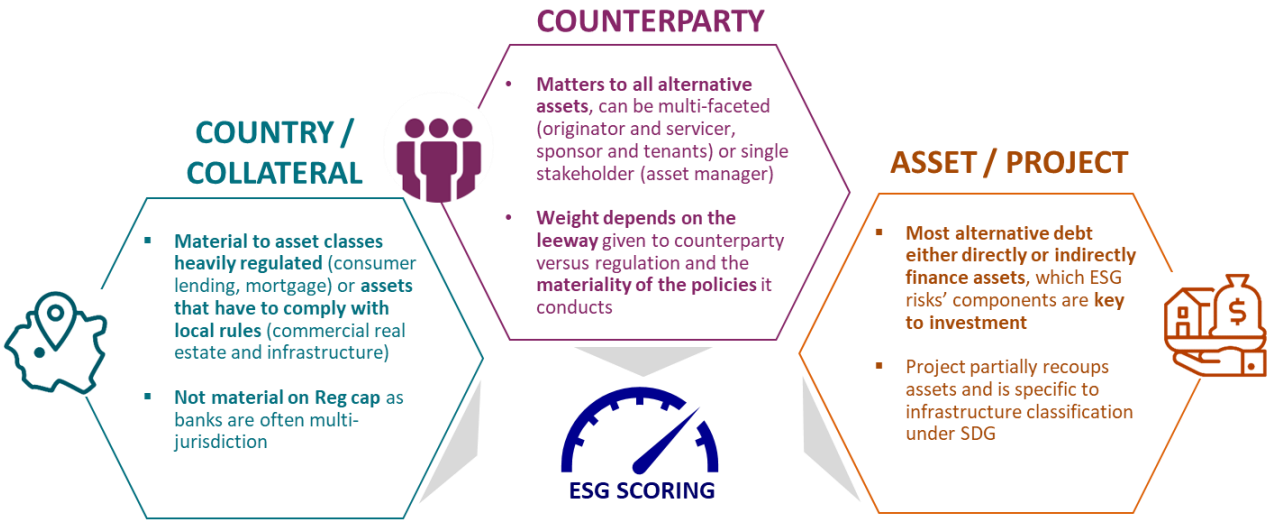
For the asset class of infrastructure equity, non-financial criteria are taken into consideration during the due diligence and investment committee process. A scoring methodology specific to this asset class has been developed for the purpose of allocating an ESG score to manage and monitor ESG risk in a consistent way across all platforms.

The ESG assessment has a total of 10 indicators[5]. Each indicator has a list of possible responses allowing us to determine a score. Our ESG evaluation accounts for criteria based on project's sector categorization under the CBI taxonomy and the EU Taxonomy for sustainable activities, including any specific environmental impacts. In addition, we assess the ESG commitments of shareholding companies or partners and review performance against specific indicators such as Health and Safety, Board gender diversity and compliance with the OECD Guidelines on Multinational Enterprises. Investment specific performance targets which are aligned with the above assessments are incorporated into the active management of direct equity infrastructure investments.

The ESG rating tool is scheduled for enhancement in the first semester of 2024 to integrate additional ESG considerations in our investment assessment.

Other alternative credit & private debt scoring methodologies

Since 2021, ESG rating has been adapted to **Alternative credit specificities** in assessing country/collateral, counterparty and asset/project factor depending on the expertise as follows:



Source: AXA IM, 2023.

Proprietary methodologies capturing other asset classes specificities through quantitative and qualitative assessment have been developed in 2021 for Collateralized loans obligations (CLOs), Insurance-linked securities (ILS), Synthetic Risk Transfer (RegCap), Asset-backed securities (ABS), Mortgages and Non-performing loans (NPL).

CLOs

We have created a proprietary methodology to assess ESG risks for new CLO investments. Both the CLO manager and the CLO portfolio are examined, which allows us a **dual and dynamic approach**.

[5] Detailed list of indicators and criteria available upon request.

The CLO manager score targets the seriousness of the CLO manager (not only when contemplating loan investments) and its ESG approach completed with calls/meetings dedicated to ESG. It allows incorporating the importance of reinvestment scheme in CLOs: a portfolio can be currently built with no strong attention for ESG but being managed by a CLO manager strongly committed to apply a solid ESG approach going forward.

We complement the analysis with questions directly focusing on loan investments which allows us to build a Portfolio score focusing more effectively on ESG rules regarding loan pools. The portfolio score assesses the accuracy of ESG criteria for the CLO manager when selecting loans. This approach still mainly relies on the CLO manager actions and convictions.

The portfolio score and the CLO manager score both lead to a global ESG score for the CLO.

ILS

We assess the 3 ESG pillars: Environment, Social and Governance using data related to the 3 key components of an ILS structure: Collateral, Sponsor and Ultimate beneficiary.

Regarding Collateral score, the scoring is performed by our Responsible Investment (RI) team for all the collaterals. We currently have an ESG rating for all our collaterals.

The Sponsor score is assessed by our RI team as well. However, for some counterparties, we currently do not have any rating that is the reason we have defined an ESG questionnaire for our counterparties (sponsors). This questionnaire serves as a basis to the assessment when there is no internal rating. We also base our research on an external provider, MSCI, to complete the assessment.

Finally, we estimate the Ultimate beneficiary score through the answers to a dedicated questionnaire which is sent to the sponsor. The ultimate beneficiary in ILS deals is usually different than the sponsor and might be difficult to know. Regarding this assessment we focus mainly on the Environment and Social pillars with limited questions on the "Governance" component.

When assessing the ultimate beneficiary score, we are trying to know who will get the cash at the end if there is an event:

- Are we hedging ultimately some corporates involved in the coal, tar sand… industries? We want to be more in line with the exclusion lists at the sponsor level buy putting some penalties on these industries without having a real exclusion like for the sponsor;
- Are we covering low-income or green insurance policies? We want to add more value on the deals such as those covering some developing countries.

AXA IM's proprietary ESG framework is based on the most relevant and material ESG risks and opportunities identified for ILS. Each component (collateral, sponsor & ultimate beneficiary) uses different weightings to reflect the accuracy of the underlying investment.

These indicators help to determine the overall ESG score, ranking from 1 to 10, of the project which serve as informative indicators of underlying ESG performance and complement the sustainability risks analysis.

RegCap

In RegCap investments, the originating bank generally designates a systemic commercial bank which sources and underwrites exposures included in the initial portfolio and replenishments. The originator is responsible for workout process when defaults occur and is the counterpart of the protection agreement and often the recipient of the deal cash collateral.

The underlying portfolio designates the portfolio structure we invest in: it sits on from the originator's balance sheet and comprises between hundreds to thousands of underlying exposures. AXA IM's proprietary ESG framework is based on the most relevant and material ESG risks and opportunities identified for RegCap investments: our methodology to assess ESG risks for RegCap investments is based on research from internal and external data providers and each new investment undergoes a specific ESG questionnaire-based analysis sent to our counterparties (originator).

In RegCap investments, each transaction is categorized through an assessment of the originating bank which focuses more effectively on ESG rules of the bank issuing the portfolio. This ESG assessment can be made either if the bank is already rated by RI teams, with an unadjusted ESG score split by E, S and G components, or if the originating bank has not yet been rated, we send it a

corporate ESG questionnaire. The answers are then subjected to "fact checking" in order to investigate the effectiveness of the declared ESG processes and rules. To conclude this analysis, we attribute an ESG score, ranking from 0 to 10, which composes 50% of the transactions' ESG total score.

Regarding the Underlying Portfolio assessment, we focus on the Originating Bank's ESG policies and exclusions in its underwriting process through the sending of an underwriting questionnaire and on a country score based on an external provider, MSCI, country-data if the underlying portfolio is mono country. Once received, the results of the ESG questionnaire are analyzed by our teams, with "fact checking" involved. We ask for examples and/or toolkit from originator to assess the seriousness of their declared ESG processes. An ESG score is then attributed based on these elements, which composes 50% of the transaction's final ESG score.

Those 2 individual ESG studies are then compiled into a global ESG score ranking from 1 to 10 for the RegCap considered transaction.

ABS, mortgages & NPL

AXA IM ABS, mortgages and NPL team decomposes its investment universe into three categories: Counterparty, Asset and Country. We assess the ESG pillars: E, S and G using data related to these 3 categories. Our methodology to assess ESG risks for ABS, mortgages and NPL is based on research from internal and external data providers (such as counterparty, country or portfolio assessment). Each new investment undergoes an ESG analysis.

Taking into account the abovementioned general exclusions, AXA IM ABS, mortgages and NPL team then categorize all new potential investment through a Counterparty assessment. This assessment relies on either an ESG questionnaire sent by the investment team or on the ESG counterparty indicators performed by AXA IM RI teams when available.

As a key element of the securitization, Assets attract a large weight in the AXA IM ESG framework. Assets are valued based on portfolio data and during the due diligence process considering the specificity of each expertise (ABS, mortgage or NPL).

Country-related indicators form parts of the asset analysis and are based on data from an external provider: MSCI. The country score captures macro risks following the three ESG pillars.

AXA IM's proprietary ESG framework is based on the most relevant and material ESG risks and opportunities identified for ABS, mortgages and NPL. Each expertise (ABS, mortgages & NPL) uses different weightings for counterparty, asset & country to reflect the accuracy of the underlying investment.

These indicators help to determine the overall ESG score ranking from 1 to 10, of the project which serve as informative indicators of underlying ESG performance and complement the sustainability risks analysis.

We produce on an annual basis an ESG Dashboard at AXA IM level aiming to summarize asset classes' contributions to the global ESG score. Using the Q^2 methodology, the dashboard below is based on AXA IM worldwide holdings' but specifically focuses on traditional asset classes – equities, sovereign bonds and corporate bonds – at the end of year 2022[6].

Other scoring methodologies for funds of funds

For investments in primary funds, a dedicated methodology was developed and is based on relevant industry frameworks such as the UN PRI, Invest Europe and the SFDR regulation.

The ESG assessment relies on answers provided by the fund manager to an ESG questionnaire divided in two parts:

i) the fund manager as a company (firm responsibility), assessing the firm's ESG governance and policy, and specific environmental, social and governance practices;
ii) the specific fund in which the investment is made (fund responsibility), assessing the integration of ESG in the investment cycle (pre-investment, ownership, transparency).

[6] Worldwide holdings include the assets managed by AXA IM Paris SA.

A separate ESG score is calculated at each level, and is ranked from 1 to 10.

The output of the ESG assessment is threefold ensuring the investment's compliance with: i) AXA IM sectorial exclusion policies, ii) minimum ESG criteria, and iii) minimum ESG score (both at firm and fund level).

A dedicated approach with separate questionnaires was developed for secondaries and co-investments to account for the specificities of such investments.

For all investments, the ESG assessment is conducted pre-investment and updated on an annual basis during holding.

II. Carbon footprint methodologies

Carbon footprint for listed assets (corporates & sovereigns)

AXA IM retrieves Scope 1, 2, and 3 data through S&P Trucost for all sectors including financials, which accounts for all upstream and downstream categories of Scope 3, as defined by the GHG Protocol Corporate Value Chain Accounting and Reporting Standard.

Specifically, to collect upstream Scope 3 emissions, Trucost uses its proprietary environmentally extended input-output (EEIO) model. This model uses input-output tables that detail how goods and services produced by each sector are used as inputs by other sectors to produce additional goods and services. By combining these extended tables with industry-specific environmental intensity factors, Trucost can assess the environmental impacts of companies not only on their own operations but on their entire supply chains. This allows for the coverage of all upstream Scope 3 categories.

To collect downstream Scope 3 emissions, Trucost uses data provided by companies themselves as much as possible.

This data is used without modification if it has been verified by a third party and if all relevant categories have been calculated. Otherwise, Trucost fills in relevant and yet-to-be calculated categories as well as empty categories using a specific sector intensity, which is determined using the company's own data as well as external reference data. This approach allows Trucost to limit data errors by excluding unverified data and using external reference data to fill in the gaps.

In the Scope 3 there are 15 categories amongst which Financed Emissions (downstream category) which is the bulk of the emissions for a financial company. However, there are only few data providers able to model financed emissions (neither Trucost, nor MSCI). It means that the methodology that AXA IM uses does not account for Financed Emissions. Hence for the financial sector, Scope 3 is mainly upstream.

Trucost's EEIO model is based on input-output tables that detail how goods and services produced by each sector are used as inputs by other sectors to produce additional goods and services. By combining these tables with industry-specific environmental intensity factors, Trucost can assess the environmental impacts not only on a company's own operations but on its entire supply chain, covering all upstream Scope 3 categories. The model uses data from various sources, including national, international, and industry databases, and is tested against disclosures collected from companies during Trucost's annual engagement program. Trucost updates its environmental impact data annually and engages with companies to incorporate the latest publicly disclosed and non-publicly disclosed environmental performance information. Trucost's EEIO model is therefore particularly useful for estimating environmental impacts in the absence of company disclosures. It allows for the assessment of environmental impacts for a company's own operations and across its entire global supply chain, provided the revenue breakdown of the company by industry sector is known.

For sovereigns, World Bank data are used to compute to compute carbon intensity at portfolio level.

AXA IM acquires the comprehensive historical record of carbon data from Trucost, but we only retain the most recent data for each scope. Generally, the data is updated up until year N-1, coinciding with when the Carbon Disclosure Project (CDP) releases the emission records.

For the purpose of reporting, complying with regulations, or addressing client requests, we generate various carbon KPIs such as absolute emissions, weighted average carbon intensity (by revenues, by enterprise value or by GDP) and portfolio carbon footprint.

Carbon footprint for real assets

Real Estate Equity

Real Estate Equity carbon footprint only covers “operational emissions”, meaning emissions linked to the energy consumed to operate a property, which are calculated with actual energy data converted into CO_2 equivalent. Such data are collected at the asset

level, in a third-party ESG data platform at least on a yearly basis, with at least a monthly-level granularity. AXA IM is only reporting CO_2 emissions with a location-based approach. Emissions currently

Before collecting consumption data, a Building Qualification form is completed to allow understanding the energy source used in the building and the split between landlord and tenant, as well as a meter form, which identifies and qualifies meters for all utilities. This information is key to the correct interpretation and verification of the consumption data collected.

The data can be collected manually by the Property Managers (from invoices, meter readings, tenant information sharing…) or automatically through supplier or smart metering connection. AXA IM utilizes both internal and external data controls to ensure the quality of the data. We examine data completeness and data quality. Throughout the data collection process automated and manual data controls are undertaken by property managers, asset managers, the RI Team and a third-party auditor.

This reporting process applies to all countries where AXA IM holds and manages real estate assets (Austria, Belgium, France, Netherlands, Luxembourg, Germany, Poland, Spain, Portugal, Italy, UK, Ireland, Denmark, Finland, Sweden, Japan, United States and Australia), except Switzerland, which is only partially embedded in this reporting process and has its own reporting process and tools.

The carbon footprint measurement excludes assets not owned for the full year, as well as assets under development, assets out of scope (parking, plot of land, forest, unit cell…) and platforms.

Data should be collected for the whole building (both landlord-controlled + tenant-controlled areas). This includes all areas for which consumptions cover and may include areas for which AXA IM does not have operational control. Data collect is mandatory only for landlord-controlled areas, where PM has direct access to energy bills. For tenant-controlled areas, the objective is to maximise their collect. For these areas consistent tenant engagement is required. Tenant Engagement may include the integration of Green Leases, organisation of ESG Engagement Meetings with Tenants, or the distribution of ESG Guides and Material to tenants.

Real Estate Equity carbon footprint is calculated with actual energy data only (no estimates), converted into CO_2 equivalent. During the collection process, two factors may impact data completeness:

- Consumption data may be missing over time (ex: data provided only for 11 months out of 12).
- The metering plan may be incomplete (surface non covered).

Coverage is measured using a coverage indicator determining the percentage of days and meters for which data is available for the asset each year. This KPI shows whether the data collected is complete and exhaustive.

GHG emissions are allocated following the recommendations from PCAF, GRESB and CRREM, released in April 2023. AXA IM portfolios are very diversified, with various level of control and ownership. For simplification reasons, the allocation follows the “operational control” allocation approach of PCAF, since this approach is applicable to a majority of assets.

Therefore, Landlord emissions are allocated to Scope 1 and 2 and tenant emissions are allocated to scope 3. Landlord emissions correspond to emissions generated by utilities for which AXA IM is the owner of the utility contract (or the PM on its behalf). To comply with the “precautionary principle”, landlord emissions are all allocated to Scope 1 and 2 at this stage, since for a majority of assets, no sub-metering system is in place to distinguish what proportion of these emissions are reinvoiced to tenant and therefore should fall in their direct scope of emissions.

However, adopting such allocation is generating an over allocation of emissions in our Scope 1 and 2, since in practice, a majority of the utility consumptions are reinvoiced to the tenants, since consumption is directly linked to tenant use and behaviour.

The landlord-controlled emissions are the emissions associated with energy sources and systems over which the property owner or operator holds operational and financial control. This includes instances where energy bills are received by the owner and where operational control is maintained, such as mechanical, electrical, and plumbing systems (MEP).

Tenant controlled emissions are stemming from energy sources and systems directly managed by tenants. This includes situations where tenants receive energy bills, have operational control, or own the energy utilities. Additionally, emissions related to tenant-owned utilities are categorized as tenant controlled.

Whole building emissions are comprehensive emissions encompassing all operational sources within a building, regardless of whether they are landlord or tenant controlled. This provides a holistic view of the building's carbon footprint. Whole building emissions are only shown if 90% of emissions are covered in time and surface for all utilities.

Scope 1 emissions are emissions that originate from landlord-controlled sources, and involve on-site fuel combustion, such as emissions from burning gas. Scope 1 emissions are only shown if they cover over 90% in time and surface.

Scope 2 emissions are indirect emissions in landlord control resulting from energy production consumed by the property, including electricity and heat purchased from third parties. Scope 2 emissions are only shown if they cover over 90% in time and surface.

Scope 3 emissions are operational emissions within the tenant-controlled domain, covering activities not owned or controlled by the property owner. Scope 3 emissions are only shown if they cover over 90% in time and surface.

The CO_2 intensity whole building is calculated by dividing the annual whole building CO_2 emissions by the total surface area of the building. The WACI is obtained by dividing the weighted annual CO_2 emissions by the weighted value of the asset.

Real Estate Debt

AXA IM retrieves Scope 1+2 data through MSCI for all CRE debt portfolio investments as defined by the GHG Protocol Reporting Standard. Specifically, to estimate Scope 1+2 emissions at building level. MSCI uses its proprietary Climate VaR model for real estate assets. This model uses inputs which include at minimum the location and country of each building, its coordinates (latitude-longitude), surface area, real estate asset class and market value and provides among its output Scope 1+2 emissions proxy information in tCO_2e/year at building level[7].

This proxy data at underlying asset level (properties financed) is then aggregated at loan level using an AXA IM Alts proprietary methodology which is based on each property's market value.

Infrastructure equity & debt

Overview

Our methodology for collecting carbon data for the Infrastructure Debt and Equity Portfolio involves two primary sources: data directly obtained from investee or borrowing companies (which may be actual or estimated by the investee or borrowing company), and proxy data provided by an external service provider, Iceberg Datalab (IDL). The data from investee companies is gathered through manually completed online questionnaires, whereas IDL supplies the proxy data.

We also directly survey investee and borrowing companies for information regarding their carbon data disclosure that allow us to qualify the quality of the collected data in line with the recommendations of PCAF guidelines. A PCAF quality score between 1 and 3 is then assigned to the GHG emissions data received from investee and borrowing companies. A PCAF score of 4 is automatically assigned to the proxy data received from IDL.

Data Consolidation and Prioritization

Once the ESG data collect is completed , the collected data is consolidated into a central database. When multiple data points exist for a single asset, such as data from both the investee company and IDL, the GHG data with the lowest PCAF score is prioritized. IDL employs a top-down modelling approach using revenue data segmented by respective revenue streams, classified using NACE codes to associate revenue with specific activities. That is why, GHG emissions data from IDL receives the highest PCAF score of 4, while data from investee or borrowing companies receives a score between 1 and 3, depending on its quality and verification level. Thus, data directly from investee or borrowing companies is always preferred.

Quality Assessment

Before integrating data into the RDR system annually, rigorous quality checks are conducted. These includes:

- Completeness Check: Verifying the number of assets included to ensure no assets are missing, maintaining data integrity;

[7] Sources: MSCI ESG Research and CRREM.

- **Revenue Data Validation**: Cross-referencing revenue data with reliable financial records to ensure accuracy;
- **NACE Code Allocation**: Confirming that each asset is correctly assigned an appropriate NACE code, mapped accurately to its respective methodology for consistency in classification and analysis;
- **Formatting Review**: Checking for and correcting any formatting errors, such as incorrect data entries or misplaced values;
- **NACE Code Mapping**: Ensuring a clear mapping of NACE codes to the methodologies used in the analysis for accurate sector and activity comparison.

PCAF Data Quality Scores

- **Score 1:** Reported carbon emission data from a GHG inventory, validated by external auditors, and disclosed in reports like sustainability or carbon emission reports;
- **Score 2:** Unaudited reported carbon emission data from a GHG inventory or estimated emissions based on energy consumption and relevant emission factors;
- **Score 3:** Estimated emissions based on relevant units of physical activity and emission factors;
- **Score 4:** Estimated emissions by Iceberg Datalab based on revenue streams and sector-based proxy factors.

Year-over-Year (YoY) Checks

The YoY check process begins with a review to identify any new investments in the portfolio. It also analyzes changes in data sources for assets with consecutive years of data, identifying shifts from proxy data to actual reported data and vice versa. Significant changes in reported emissions, such as a company reporting lower emissions despite reduced business activities, are investigated with the relevant investment teams for justification.

Emission data is analyzed by calculating the differences in Scope 1, 2, and 3 emissions between the current year and the previous year for both actual and proxy data. Due to potential estimation methodology variations, a separate YoY check is conducted on the data provider's estimates to identify outliers requiring further investigation.

Comparison Within the Same Year Dataset

For comparison within the same year dataset:

- Emissions are normalized by the amount of revenue (in euros) spent, allowing for accurate comparison of emission efficiency across entities and sectors;
- Revenue streams are sorted by sectors and methodologies applied, facilitating structured analysis of emission profiles.
- Rankings within each sector based on emissions per euro spent are validated for plausibility;
- Country differences within each sector are examined to identify variations in emission profiles and trends;
- An analysis of the highest to lowest emitters within a sector is conducted based on revenue and emissions to compare sector specific emission profiles;
- Emission profiles are compared across sectors to identify overarching trends and differences in emission efficiency.

Carbon footprint for alternative credit & private debt

For Alternative credit, Natural capital & Impact assets, WACI figures have been established using borrowers' carbon metrics sourced from third-party data provider Reorg Findox for the Leveraged loans, Private debt and CLOs universes as well as underlying assets' originator's carbon data sourced from third-party data provider Trucost for the ABS, Significant risk transfer transactions (SRT) and ILS universes, through their ESGx SFDR reporting tool, using:

- The latest available ESG data available from the ESGx product for each underlying issuer;
- Financial data of the end of the applicable reporting year where available.

For each of the underlying ESG data points used to calculate the corresponding PAI, ESGx by Reorg will disclose the percentage coverage of the underlying ESG data.

Carbon footprint for private markets & hedge funds

AXA IM Prime's portfolios' financed emissions are calculated following the GHG Protocol guidelines and the Partnership for Carbon Accounting Financials (PCAF) guidelines for calculating financed emissions. AXA IM Prime calculates both absolute and intensity-based figures for scopes 1, 2 & 3 of its underlying investments. Scope 3 emissions are tracked separately due to limitations in data availability and quality identified during footprinting exercises. AXA IM Prime will continue to collect and track Scope 3 emissions as their disclosure becomes more important in the coming years.

With respect to data sources, AXA IM Prime uses both financial metrics and GHG emissions provided directly from General Partners (GPs). When financial data are available, but the GHG emissions for the underlying AUM are not provided, GHG emissions are estimated using economic activity-based emission factors, in line with the PCAF recommendations.

As part of the calculation exercise a PCAF data quality score from 1 to 5 (1 being the highest quality score / 5 the lowest) is calculated according to the PCAF recommendations, to facilitate data transparency and identify areas for improvement. AXA IM Prime can allocate a data quality score per at an asset level and can also calculate consolidated data quality scores at a fund, asset manager and portfolio level.

III. Biodiversity footprint methodologies

Biodiversity footprint for listed assets (corporates)

A key biodiversity-related tool we currently use is the Corporate Biodiversity Footprint (CBF) developed by Iceberg Data Lab (IDL)[8] and I Care & Consult[9]. The CBF provides data on the potential contribution of issuers or sectors invested to the degradation of biodiversity and thus a allows users to start identifying their exposure to nature-related risks. The CBF is currently used for corporate issuers.

Overview of the CBF

The CBF currently measures the extent of a company's estimated negative impact on biodiversity for a given year. This appraisal is based on the impacts generated from the products purchased or sold by companies calculated throughout their value chain.

The CBF measures impacts in terms of contributions to biodiversity loss resulting from the environmental pressures generated by investees' economic activities across their value chain. Amongst the factors contributing to biodiversity loss identified by IPBES, the CBF currently captures impacts associated to land use occupation and land use change, GHG emissions (climate change contribution), water and air pollution. The CBF is calculated via science-based models (including GLOBIO [10]) which have their limits; other remaining drivers of biodiversity loss such as sea use change, invasive species, and overexploitation of natural resources identified by IPBES are not yet covered by IDL's CBF. Some other pressures are only captured partially (e.g., water and air pollution). This may change in the future.

To advance further on the analysis of biodiversity loss drivers, IDL, together with other organisations, is a member of the EU Commission Align project whose objective is to co-develop recommendations for a standard on biodiversity measurements and valuation.

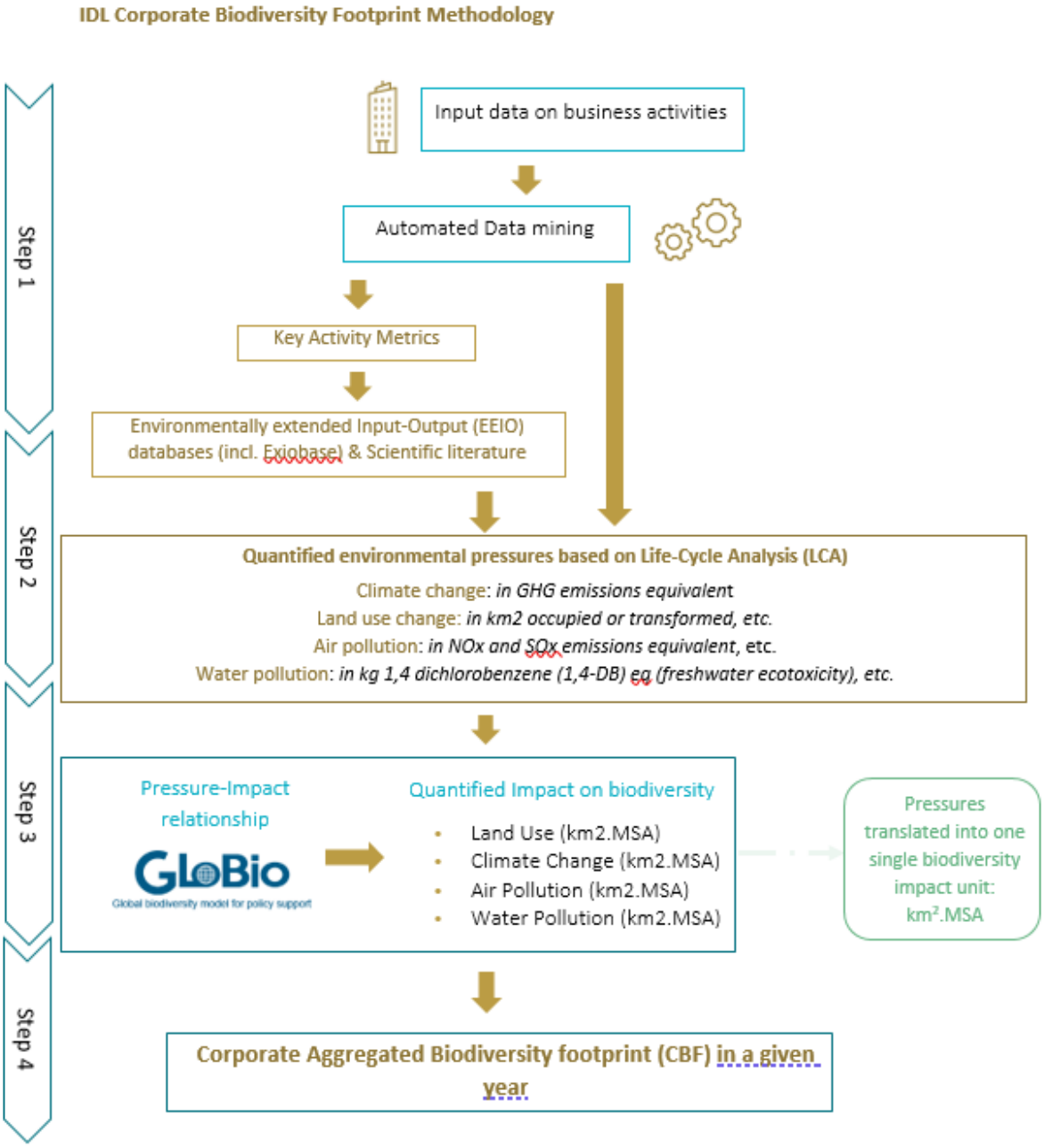
The value chain approach integrated in the CBF allows to measure direct pressures and impacts generated by a company own activities (Scope 1: GHG emissions coming from the combustion of fossil fuels or chemical reactions, surface artificialization or occupied directly by the company, etc.), by its electricity, steam, heat, and cooling purchase for site-level use (Scope 2), as well as indirect impacts resulting from the company's purchases and supply chain (Scope 3 upstream) and products and services sold (Scope 3 downstream)[11].

CBF Methodology

More concretely, calculation of the CBF is done **in several steps** (see graph below):

1. Define the company's distribution of sales by sector (NACE nomenclature) and by country;
2. Based on this segmentation, and thanks to IDL internal physical Input/Output model, establish a list of products and services purchased and sold by the company throughout its value chain based for each NACE sector and each country;
3. Based on a life-cycle analysis (LCA), calculate the company's environmental pressures (climate change, land use change, air pollution and water pollution) for each product and service;
4. Using pressure-impact functions (mainly from GLOBIO model), translate the environmental pressures into potential impacts on biodiversity, all expressed with the same aggregable metric;
5. Aggregate the different impacts into an overall absolute impact at company level.

[8] Iceberg Data Lab
[9] I Care - Conseil en stratégie et environnement (i-care-consult.com)
[10] GLOBIO - Global biodiversity model for policy support - homepage | Global biodiversity model for policy support
[11] Scope 1, 2 and 3 are defined in line with GHG Protocol, same definitions of Scopes are used by IDL CBF for biodiversity.



Source: Iceberg Data Lab, 2021.

The unit of biodiversity impact used to calculate CBF is the km².MSA : this unit may be interpreted as the potential surface of pristine and undisturbed ecosystem lost as a consequence of the environmental pressures exerted by a company.

This metrics results from the combination of two components:

1) The MSA expresses the average abundance of native species in an ecosystem relative to their abundance in an ecosystem undisturbed by human activities and pressures. In IDL's model, the impacts are first expressed in terms of relative change in species abundance as compared to a reference (% MSA);

2) The relative impact (% MSA) is then associated with the potential surface of ecosystems affected (in km^2) to produce an absolute measurement of a company's impacts on biodiversity (km².MSA).

MSA[12] is among the most widespread biodiversity metrics today and presents several advantages:

- It is relevant for biodiversity as based on species abundance. It allows to measure a proxy of global impact of human activities on ecosystems. MSA figures among recognised indicators referenced by IPBES, IPCC, CBD;
- It has already been studied and tested by academics and professional experts;
- It offers a holistic proxy to the biodiversity impact of corporates and allows for comparison between sectors, companies, and progress tracking. It is therefore adapted to evaluate biodiversity impact at an investment portfolio level.

The CBF impacts are modelled at the product or corporate level depending on the pressure and scope (1, 2 or 3). The inclusion of corporate reported data allows to increase the quality of the results. The CBF provides an estimated negative impact measure, meaning that by using this metric, investors can estimate the volume of biodiversity loss caused by pressures generated by a company's economic activities in equivalent of surface of ecosystems artificialized[13] due to the companies' environmental impacts in a given year.

CBF at company level

As explained above, first, at company level, the calculation of the CBF starts with an analysis of the distribution of a company's total sales per NACE sectors and country. If not disclosed by the company, the distribution of sales per sector is modelled by IDL. Once the sales are mapped, IDL associates value chains and a list of products and services purchased and sold to each of the company's business segments, based on input and output data from external databases as well as IDL proprietary input and output model.

Based on the value-chain mapping of a company's products' flows (Scope 1, 2 and 3), IDL uses LCA emission factors to calculate the level of land use change, GHG emissions, air pollution and water pollution associated with a company's activities. Using science-based pressure-impact functions (mainly from GLOBIO model[14]), IDL then translates all of the four modelled pressures into biodiversity impacts expressed in km^2 MSA in a given year. At each calculation step, modelled data may be replaced by corporate reported data whenever available.

Impacts are then aggregated into an overall absolute footprint on a company level referred to as the CBF and expressed in the unit km2.MSA.

Interpret the CBF metric: What would a km^2 MSA of -15 mean?

In other words, CBF of for example -15 km^2 MSA for a given company can be interpreted as an equivalent surface of 15 km^2 artificialized completely (*i.e.*, 15 km^2 of pristine forest lost) due to pressures generated on biodiversity by a company's activities across associated value chain (purchases, products and services) in a given year.

The CBF at the company level is also provided by IDL on a disaggregated basis by Scope (Scope 1, Scope 2, Scope 3 – upstream, Scope 3 – downstream) and by biodiversity pressure (Land Use Change, GHG Emissions, Air Pollution, and Water Pollution). This allows users to better understand where a company's pressures on biodiversity may emanate from.

A company reporting data on all biodiversity pressures associated with all its activities is still a rare practice. Most of the data used is modelled data. IDL publishes a Data Quality Level indicator for each company analysed at the aggregate and disaggregated level by scope and pressure to track the degree of reported versus modelled data.

The following is an illustrative case study of a company's CBF.

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[12] The definition provided is based on IDL's methodology. This indicator was proposed as part of the development of the GLOBIO3 model, the objective of which is to simulate the impact of different human pressure scenarios on biodiversity. The GLOBIO model was developed by PBL Netherlands Environmental Assessment Agency to quantify global human impacts on biodiversity (Source: IDL Methodology).

[13] Artificialization of an environment, of a natural or semi-natural habitat is the loss of its qualities. The term refers to the loss of biodiversity and ecosystems destruction. Artificialization corresponds to the transformation of an environment due to the human presence.

[14] The GLOBIO model calculates only local terrestrial biodiversity intactness via MSA (sea or ocean are not considered): GLOBIO - Global biodiversity model for policy support - homepage | Global biodiversity model for policy support

Case study – Nestlé SA (Agri-food company)

Nestlé SA is a multinational food and beverage company that is active in different segments: cereals, dairy products, cocoa and chocolate, oil & fats, bottled water, etc.

According to the Iceberg Data Lab's analysis using 2020 data, Nestlé's corporate biodiversity footprint is - 11 996 km2.MSA of which 98% is driven by land use change.

Nestlé's corporate biodiversity footprint is specifically driven by its supply chain through the land needed for the raw materials used to manufacture its products. Scope 3 upstream accounts for 99% of its corporate biodiversity footprint. In particular, the presence of such high-impact commodities in its product mix such dairy products which require high land use occupation including to breed and feed the dairy cattle, as well as cocoa beans and cereals needed to manufacture its chocolate and snack products which require a higher land use occupation than other crops.

Nestlé has good disclosure on the sales per segment and per country and considers price differences between locations. Nestlé's Data Quality Level is 3 on a scale of 1 to 5 with 1 being the best. Higher levels of disaggregation and company reported data allows for a high-quality analysis and calculation of the corporate biodiversity footprint.

Source: Iceberg Data Lab as of 31/12/2022. Note that the figures and findings above are intended for illustrative purposes only and are subject to change according to the most recent updates in Iceberg Data Lab's year of analysis and model versions of the CBF.

CBF at portfolio level: AXA IM's portfolios biodiversity footprint

IDL calculates a biodiversity footprint on a company level, which can then be aggregated at a portfolio level following the same logic and aggregation metrics as for portfolio carbon footprint. This aggregation takes into account enterprise value including cash (EVIC). Biodiversity footprint on a portfolio level is then estimated in km^2.MSA / M€ invested. Note that currently, CBF data aggregation on a portfolio level is done without treating double counting, which may change in the future.

Limitations

Biodiversity footprinting metrics like the CBF should be interpreted as representing estimated, modelized impacts on biodiversity, capturing some but not all potential pressures. As a measurement proxy for likely biodiversity impacts of investee companies, they can be used to better understand potential risk exposure at a point in time and used to support gradual biodiversity mainstreaming in investment processes. While they can provide an initial understanding of impacts, model and inherent limitations mean these should progressively be complemented with a diversity of other research, tools, and metrics.

While insightful, biodiversity footprinting results produced by the CBF should still be interpreted with caution as they are calculated using a modelling approach relying on several hypotheses and assumptions at each calculation step. Any interpretation should bear the following limitations in mind:

- The level of integration of corporate bottom-up data in IDL's model is constrained by corporate disclosure. As CSRD and TNFD become widely adopted, corporate data will become increasingly available which will likely lead to more accurate estimations;
- Certain factors are not yet included in IDL's current model. Namely, not all biodiversity pressures are covered (for example invasive alien species, and sea use change, natural resource use and exploitation), some pressures may be partially calculated for certain sectors and value chain segments, (e.g. plastic pollution), and while impacts are calculated for freshwater and terrestrial biodiversity, they do not cover marine biodiversity;
- Synergistic effects are not taken into account in IDL's model. In the environment, pressures interact with one another, often causing even bigger impacts on ecosystems than the sum of individual pressures;
- MSA only reflects one dimension of biodiversity (species abundance) while science considers that at least 21 variables are essential to accurately describe biodiversity. The MSA indicator would likely have to be completed by a variety of other indicators to more fully capture negative impacts capture negative impacts more fully on biodiversity;
- Economic indicators can influence the results, namely the EVIC which is used for attribution may cause distortions.