



Preqin **ESG Solutions**

ESG Profiles | ESG Risk Analytics | Impact Potential

Update to methodology in progress



Contents

Part I Prequin's ESG Solutions

Page

- 3 [Introducing Prequin's ESG Solutions](#) ↗

Part II ESG Profiles

Page

- 4 [Introducing ESG Profiles](#) ↗
- 5 [ESG Transparency KPIs](#) ↗
- 8 [ESG Affiliations](#) ↗
- 9 [ESG Fund Labels](#) ↗
- 11 [LP ESG Mandates](#) ↗
- 12 [GP Regulatory Disclosures](#) ↗

Part III ESG Risk Analytics

Page

- 13 [Introducing ESG Risk Analytics](#) ↗
- 15 [Identifying and Measuring ESG Risk](#) ↗
- 19 [Data Update Process](#) ↗
- 20 [Company Metrics](#) ↗
- 21 [Carbon Metrics](#) ↗
- 22 [Water Metrics](#) ↗
- 23 [Employee Metrics](#) ↗

Part IV Impact Potential

Page

- 25 [Introducing Impact Potential](#) ↗
- 27 [The Step-by-Step](#) ↗

Appendices

Page

- 28 [Appendix A: Initial Pool of ESG Indicators Assessed for the Transparency KPIs](#) ↗
- 32 [Appendix B: ESG Transparency KPIs](#) ↗
- 37 [Appendix C: ESG Transparency KPIs Disclosure Guidance](#) ↗
- 40 [Appendix D: ESG-Related Affiliations and Initiatives](#) ↗
- 42 [Appendix E: Full List of Affiliations](#) ↗
- 43 [Appendix F: ESG Risk Analytics Data Sources and Data Understanding](#) ↗
- 49 [Appendix G: ESG Geography Risk Score Data Sources](#) ↗
- 52 [Appendix H: Risk Exposure Estimate Step by Step](#) ↗
- 57 [Appendix I: Impact Industry Taxonomy](#) ↗

Introducing Preqin's ESG Solutions

The adoption of environmental, social, and governance (ESG) investment strategies in private markets continues to grow, but the opaque nature of the industry brings its own unique challenges. Finding quality ESG data at scale for alternatives is one of the key obstacles to wider adoption. Recent years have shown an unprecedented demand for ESG integration across the industry, necessitating the expansion of accessible, high-quality ESG data in the space.

Preqin has played an important role in the development of transparent ESG data across private asset classes. Working with an ESG Advisory Council comprised of more than 50 clients, through a partnered research and development program, we were able to identify, collect and make actionable a core set of ESG data designed specifically for private market participants.

Since the launch of our first ESG dataset in 2019, we have been rapidly innovating, providing the market with high-quality ESG data at scale. We respond to new regulations and best practices that are adopted across the industry and continue to evolve with the market. Our initial offering included information on ESG and impact investing policies, as well as a limited set of third-party ESG affiliations. We widened our dataset in 2020 and launched ESG Profiles with expanded affiliations and ESG contacts data and an entirely new dataset of key performance indicators (KPIs) to assess transparency levels of General Partners' (GPs) and Limited Partners' (LPs) ESG policies and practices.

In 2021, we launched the industry's first ESG Risk Exposure Estimates and Impact Potential Estimates for private markets, at scale. With global coverage spanning across a large dataset of private sponsor-backed companies, these tools provide both a portfolio-level overview as well as a more granular view and understanding of ESG risk and impact at the asset level.

In 2022, we expanded our ESG Risk Analytics solution to incorporate private company metrics, including employee net growth and volatility, carbon emissions and water withdrawal estimations.

These efforts have culminated in a three module product, hereafter referred to as Preqin ESG Solutions, comprising of ESG Profiles, ESG Risk Analytics, and Impact Potential.

Preqin ESG Solutions provides our clients with crucial ESG data and insights, and the tools to seamlessly embed them into their investment workflows. Our mission is to mitigate the challenges stakeholders face when integrating ESG factors in private markets by providing our clients with quality, scalable ESG data.

This document outlines the inputs, processes, and models behind ESG Solutions, as well as potential use cases of our tools.

Introducing ESG Profiles

Preqin's ESG Profiles give our clients visibility into GP and LP firm-level information, including any disclosed ESG policies, practices, and initiatives, their third-party commitments, key ESG contacts, as well as additional relevant ESG data, where applicable.

The following datasets are included in ESG Profiles:

- **ESG Transparency KPIs:** A measure of transparency, using ESG KPIs derived from private market best practices and leading ESG disclosure frameworks to track disclosures of GPs and LPs.
- **ESG Affiliations:** Known third-party affiliations which may be used to inform of ESG priorities and commitments.
- **ESG Contacts:** Key ESG points of contact at a GP and LP firm.
- **LP ESG Mandates:** Identifies LPs with an active investment mandate in ESG-related opportunities.
- **ESG Fund Labels:** Classification of a fund's ESG-related investment philosophy using the following tags: ESG, Sustainable Development Goals (SDG), Impact, Climate, Sharia, and European Union Sustainable Finance Disclosure Regulation (SFDR) Article 8 and Article 9 funds.
- **Regulatory Disclosures:** ESG reporting mandates required by various global regulatory standards

The following sections will provide additional insight into the above components, including data collection processes and use cases.

ESG Transparency KPIs

Preqin's Transparency KPIs identify and track indicators relevant to ESG policies, practices and initiatives of GPs and LPs. There are 37 indicators for GPs, and 12 for LPs. By leveraging existing reputable ESG frameworks and standards, Preqin has curated a set of core ESG data points, specifically applicable to private markets. Relying on valuable input from our ESG Advisory Council, this product was designed to incorporate and build upon existing knowledge in the field. The selected KPIs were sourced from the following frameworks:

The following datasets are included in ESG Profiles:

- The Sustainability Accounting Standards Board (SASB)
 - List of indicators as part of the Materiality Map for Asset Management sector¹
- The United Nations Principles for Responsible Investing (UNPRI)
 - List of indicators as part of standardized UNPRI Transparency Reports for firms²
 - List of questions and best practices from UNPRI Technical Guide for Limited Partners³
 - List of questions from UNPRI LP Responsible Investment DDQ⁴
- Institutional Limited Partners Association (ILPA)
 - List of questions from the ILPA Due Diligence Questionnaire⁵
- The Task Force for Climate Related Financial Disclosure (TCFD)
 - List of questions from the TCFD Recommendations⁶
- Public market ESG Ratings providers

- List of indicators commonly applied to public market analysis and ESG ratings by MSCI, Sustainalytics, ISS, and other public market ratings providers

We identified 285 data points to serve as a starting point for our transparency KPIs. These indicators are listed in the Initial ESG Indicator Pool included in [Appendix A](#) along with their sources (except those sourced from public market ESG ratings providers due to redistribution restrictions).

This initial list was then sorted in order to identify those applicable specifically to ESG Integration in private markets. As visualized in Fig. 1, the indicator pool was adjusted per the following steps:

1. Identify and remove duplicate indicators (51 indicators).
2. Identify and remove indicators that deal specifically with ratings or assessments that cannot be easily modified to focus on disclosure (125 indicators).
3. Identify and remove indicators that are purely informational such as signatory affiliations (55 indicators).
4. Identify and remove non-material or non-relevant indicators for private markets (17 indicators).

¹ <https://materiality.sasb.org/>

² <https://www.unpri.org/transparencereports/382.subject?adredir=1>

³ <https://www.unpri.org/privateequity/technicalguideforlimitedpartnersresponsibleinvestmentprivateequity/5657.article>

⁴ <https://www.unpri.org/privateequity/lpresponsibleinvestmentddqandhowtouseit/113.article>

⁵ <https://ilpa.org/duediligencequestionnaire/>

⁶ <https://www.fsbtcfid.org/wpcontent/uploads/2017/06/FINAL2017TCFDReport11052018.pdf>

Following this process, we were able to isolate 37 indicators most relevant to the private market context and our intended use cases. Each indicator has been categorized according to the following tags in order to create bespoke filters for varying client use cases:

- **Governance Type:** tags indicating whether the indicator is primarily related to firm, portfolio or asset-level governance.
- **ESG Pillar:** tags indicating whether the indicator is primarily related to environmental, social, or governance pillars.
- **ESG Theme:** tags indicating the SASB material issue or theme, as well as themes specific to private markets.
- **ESG Framework:** tags that indicate the frameworks from which the indicator is sourced.

A full list of transparency indicators and their corresponding categorizations is included in [Appendix B](#).

Additionally, a frequency percentage is provided which gives users insight into the rate of disclosure for each of the 37 indicators. This is done by calculating the percentage of global fund managers in Preqin’s database that have publicly or privately disclosed a particular indicator.

Fig. 1: Selecting ESG Transparency KPIs for Private Markets



Data Collection

Preqin has a dedicated ESG Research Team responsible for ESG data collection. Transparency profiles are populated with data sourced in one or both of the following ways:

- **Public disclosures:** Information available through the public domain included in legal filings, regulatory disclosures, sustainability reports, on a firm's website, or in other related documents that satisfy the criteria listed in [Appendix C](#). These are currently identified and validated manually by a trained team of ESG-specific researchers and quality checkers.
- **Private disclosures:** Private documents shared with Preqin that satisfy the same criteria as public disclosures. This feature of Preqin's ESG Profiles allows for a more comprehensive representation of a firm's ESG efforts. To ensure data quality while respecting our clients' privacy concerns, these documents are securely submitted to Preqin's ESG Research team by use of our encrypted document storing capabilities. They are then reviewed internally to ensure all relevant criteria are met, and any private

disclosures are reflected on firm profiles without a source. This unique data collection process is made possible by leveraging Preqin's strong relationships with our clients and our esteemed reputation in the industry.

To uphold data quality and consistency, disclosures must satisfy a list of criteria outlined in the ESG Transparency KPIs Guidance included in [Appendix C](#). The guidance was written to provide greater transparency into our data collection process and to provide Preqin's clients with documentation for deeper engagement where desired.

Firms' Transparency Profiles are updated on an annual basis (with public disclosures) or on a rolling basis (with public and/or private disclosures), by request. All collected documents must have been updated in the past two years to be considered valid disclosures.

Generating an ESG transparency metric

After identifying the 37 ESG indicators at the core of our Transparency KPIs, an ESG transparency metric was calculated for GP profiles. Mathematically, this metric simply indicates the percentage of ESG KPIs that are publicly or privately disclosed.

$$\text{Preqin ESG transparency metric} = \frac{\text{ESG KPIs disclosed}}{\text{Total ESG KPIs}}$$

Preqin's ESG transparency metric provides our clients with an indication of how transparent a firm is on core facets of ESG.

Our search functionality enables simple comparison by allowing users to sort firms using a variety of ESG filters, including:

- A firm's overall ESG transparency percentage
- Disclosure of specific Transparency KPIs
- Transparency KPI Governance Type (Firm, portfolio, or asset-level)
- ESG Affiliations

As well as various core filters including, but not limited to:

- AUM
- Asset class
- Location
- Strategy
- Sector
- Geographic exposure

ESG Affiliations

Our extensive dataset tracks 40+ third-party organizations to which LPs and GPs are affiliated, selected based on their prevalence in the industry. This information is collected from the public domain by Preqin's ESG Research team and conveniently included on both LP and GP ESG profiles. Similar to our transparency KPIs, a frequency percentage is also included to allow users to easily identify what percentage of Preqin's database of 60k+ LPs and GPs are affiliated with a particular organization.

Clients can easily identify priority ESG topics and commitments of an investor or fund manager through their association with a particular organization. This gives further insight into a firm's ESG practices, indicating commitments that are perhaps otherwise not publicly disclosed.

Please see [Appendix E](#) for a full list of Affiliations currently tracked by Preqin.

ESG Fund Labels

Preqin is currently tracking the following types of ESG-related funds:

- **ESG Integration:** Funds with focus on the consideration of environmental, social and governance principles in their investment strategies. These may encompass ESG as a whole or the E, S or G individually, with financial returns remaining the funds' primary directive.

How is it tagged?

ESG funds are tagged in one of three ways:

1. 'ESG' included in the name
2. Marketing materials or other collateral that explicitly identifies the fund as ESG
3. GPs self-declare their fund to be ESG

- **Climate:** Funds with focus on supporting the mitigation of climate issues.

How is it tagged?

Climate funds are tagged in one of three ways:

1. 'Climate' included in the name
2. Marketing materials or other collateral that explicitly identifies the fund as climate
3. GPs self-declare their fund to be climate

- **Impact:** Funds with focus on generating positive social or environmental effects. These funds are generally values-driven and prioritize societal or environmental benefits over financial performance.

How is it tagged?

Impact funds are tagged in one of three ways:

1. 'Impact' included in the name
2. Marketing materials or other collateral that explicitly identifies the fund as impact
3. GPs self-declare their fund to be impact

- **SDG:** Funds seeking investments in portfolio companies aligned with the United Nations Sustainable Development Goals.

How is it tagged?

SDG funds are tagged in one of three ways

1. 'Sustainable Development Goals' included in the name
2. Marketing materials or other collateral that explicitly identifies the fund as SDG
3. GPs self-declare their fund to be SDG

- **Sharia Compliant:** Faith-based investments compliant with Sharia Law and the Islamic religion's principles it represents. Sharia funds do not invest in companies that deal with the production of weapons, alcohol, pork, gambling, tobacco, etc. Some key principles include promoting businesses that benefit society, excess leveraging, no short-selling, derivatives, or futures trading, and investments with increased transparency.

How is it tagged?

Sharia compliant funds are tagged in one of three ways:

1. 'Sharia' included in the name
2. Marketing materials or other collateral that explicitly identifies the fund as Sharia compliant
3. GPs self-declare their fund to be Sharia compliant

- **SFDR Article 8:** Fund type defined by the European Union's Sustainable Finance Disclosure Regulation (SFDR) as promoting environmental and/or social matters without having sustainable investment as its primary objective (e.g., not impact funds). What qualifies as promotion:
 - Any disclosure or provision of information and an "impression" that the investments pursued by a fund also consider specific environmental or social characteristics
 - Principal adverse sustainability indicators (PASIs) integrated into investment decisions

Other criteria:

1. Fund must be subject to binding criteria in relation to the environmental and/or social characteristics mere integration of sustainability risks is not sufficient
2. Investee companies must have good governance practices

How is it tagged?

Article 8 funds are tagged in one of two ways:

1. Official filings have "Article 8" in the name.
2. GP self-declares the fund to be an Article 8 fund

- **SFDR Article 9:** Fund type defined by the European Union's Sustainable Finance Disclosure Regulation (SFDR) whose objective is either sustainable investment or reducing carbon emissions. What qualifies as sustainable investment:
 - Any economic activity that contributes to an environmental or social objective, as long as such an investment does not significantly harm any of those objectives
 - Investee companies follow good governance practices

How is it tagged?

Article 9 funds are tagged in one of two ways:

1. Official filings have "Article 9" in the name
2. GP self-declares the fund to be an Article 9 fund

LP ESG Mandates

LP Mandates allow Preqin customers to identify LPs who have announced their commitment to investing in ESG-aligned funds or assets within the next 12 months. Leveraging our strong client relationships, Preqin's Investor Research team collects proprietary information directly from LPs regarding their investment plans over a 12-month period. This dataset includes:

- Types of managers they plan to invest with
- Number of funds they plan to invest into
- Asset classes
- Strategies to be employed
- Locations and markets
- Industries

LP ESG Mandates expand this dataset by tagging firms committed to including ESG in their investment plans during the indicated investment period. This gives our clients visibility into how much capital will be directed toward ESG funds and by whom.

GP Regulatory Disclosures

Preqin's Regulatory Disclosures track firm-level disclosures mandated by regulatory bodies. Our dataset currently includes the following disclosure types, collected through the public domain by Preqin's ESG Research team:

- **SFDR Article 3:** Disclosure of a 'Sustainability Risk Policy' that includes information on the integration of sustainability risk considerations in the firm's investment decision-making process.
- **SFDR Article 4:** Disclosure of the firm's rationale for not publishing a 'Principal Adverse Impacts Statement (PAI)' that includes a due diligence assessment of sustainability impacts.
- **SFDR Article 5:** Disclosure of remuneration policies that include information on the firm's integration of sustainability risks considerations.

Introducing ESG Risk Analytics

The rise of ESG considerations in investment strategies has made it necessary to capture ESG risk at different levels – from individual portfolio companies, through investment portfolios up to fund management firms. This task is particularly daunting in the case of private markets, where proprietary portfolio company-level data that fund managers may access is not universal, standardized, or sufficiently granular. This section describes how Preqin’s ESG Risk Analytics addresses these issues.

The main purpose of Preqin’s ESG Risk Analytics is to measure an investment’s exposure to ESG risk factors, which could materialize as costs in the future. To capture the exposure, we both 1) identify the sources of risk, and 2) evaluate its relative magnitude. Costs may be incurred through any material damage to a broad spectrum of agents. The key stakeholders include firms, their shareholders and employees, municipalities, government, or natural environment. In consequence, the risk that we capture encapsulates both impact and financial risk.

The ESG risk exposure is first calculated at the portfolio company level, for 147,000+ private companies.

- Every time an investment fund makes a deal, it acquires a fraction of an existing business.
- The pre-existing risk at the level of the acquired company contributes to the risk of the resulting investment portfolio. This in turn allows us to identify exposure to risk at the level of a particular fund.
- Since each fund has an identified owner, the final step of the aggregation provides an overview of material ESG risk exposure at the level of an individual manager firm.

The risks identified as the most prominent for a given fund or a specific fund manager are deemed to be the most likely to generate surprises, adversely affecting stakeholders. We will refer to this holistic process of quantifying risk at different levels as measurement of risk exposure at scale.

Details of Preqin's ESG Risk Analytics

Preqin's ESG Risk Analytics provides the only solution on the market which enables measurement of ESG risk exposure at scale in private markets, from a single deal through portfolio up to manager level. These measurements come in the form of 0.0-10.0 scores, with 10.0 representing the highest and 0.0 the lowest risk exposure. When comparing scores within a given portfolio company, it provides a view of "how material a given ESG issue is relative to others". When comparing scores across portfolio companies, it provides a view of "how material a given issue is to this company relative to other portfolio companies".

Relative scores within a portfolio can highlight blind spots in processes and philosophy since they reveal the severity of sustainability issues that could

generate costs for stakeholders. Relative scores across portfolios indicate the composition and the origins of the underlying risk exposure. Finally, comparison of scores within fund manager firms indicates where their exposure to ESG related risks accumulates and whether these risks are diversified.

Comparison of scores across fund manager firms might inform about their appetite for risk. To make fund-level scores easier to interpret, 0.0-2.5 range is assessed as "Low", 2.5-5.0 as "Moderate", 5.0-7.5 as "High", and 7.5-10.0 as "Very High". Our solution was designed with the objective of providing consistent and reliable insights. It is also data-driven rather than analyst-driven and purposefully neutral, which minimizes the possibility of unconscious bias.

The Role of industry and geography

The objective of our methodology is the evaluation of Risk Exposure Estimates for individual portfolio companies. A natural solution would be to rely on firm-driven disclosure metrics, just as in the case of publicly traded firms. Unfortunately, this approach is not feasible. While in private markets many fund manager firms may have access to their own proprietary portfolio-company-level data or asset-level information, this data is not necessarily consistent, conformable, or accessible at scale. Hence the models developed for more opaque private markets are used to gap-fill.

What allows us to assign a risk proxy to each portfolio company is that they all have two fundamental characteristics – an industry in which they operate and a geographic location in which their headquarters are based. It is unlikely that a company would be exposed to different sources of risk than its competitors. The regulatory, economic, and physical environment is a decisive factor determining if risk to stakeholders materializes as cost. Based on a set of 177 publicly available indicators, we developed a framework analogous to risk assessment of publicly traded companies to evaluate the ESG risk exposure score of each private company in the market.

The formulation of our risk exposure model imposes limitations on how it can be used. Our methodology requires each corporate identity to be tagged with an industry. Hence, at this point, it is only applicable to private equity, private debt, and venture capital. ESG Risk Exposure scores were designed to be compared across portfolio companies, portfolios, and fund manager firms. As a result, a level of a score cannot be used to measure absolute risk.

The fundamental risk exposure we attribute to portfolio companies is the general industry risk which is next modified by geography in which their headquarters are located. Hence any two firms operating in the same industry and geography will inevitably have the same ESG risk exposure score. We do not claim that each two IT firms based in the United States are equally risky from the perspective of ESG. What we say instead is that for any IT firm its key risks stem from violation of e.g., Customer Privacy, breach of Data Security or fierce Competitive Behavior of other market participants. All these risks are more likely to materialize as costs in the US, where a company can be sued in a class action or over an infringement of intellectual property rights.

Identifying and Measuring ESG Risk

To identify the sources of material industry risk we leveraged well-established standards, provided by Sustainability Accounting Standards Board (SASB). SASB pillars and SASB factors form the basis of our broad categories (and subcategories) from which ESG risks originate. To measure the magnitude of industry risk we relied on several Key Performance Indicators (KPIs), collected from various publicly

available sources. These sources include non-governmental organizations, academic research, market regulators, international agencies, and the offices of national statistics. Tagging these KPIs to each of the SASB factors gave us a common language between public and private market ESG risk assessments.

Fig. 2: Mapping of SASB Pillars and SASB Factor

SASB Pillar	SASB Factor
Business Model & Innovation	Business Model Resilience
Business Model & Innovation	Materials Sourcing & Efficiency
Business Model & Innovation	Physical Impacts of Climate Change
Business Model & Innovation	Product Design & Life-cycle Management
Business Model & Innovation	Supply Chain Management
Environment	Air Quality
Environment	Ecological Impacts
Environment	Energy Management
Environment	GHG Emissions
Environment	Waste & Hazardous Materials Management
Environment	Water & Wastewater Management
Human Capital	Employee Engagement, Diversity & Inclusion
Human Capital	Employee Health & Safety
Human Capital	Labor Practices
Leadership & Governance	Business Ethics
Leadership & Governance	Competitive Behavior
Leadership & Governance	Critical Incident Risk Management
Leadership & Governance	Management of the Legal & Regulatory Environment
Leadership & Governance	Systemic Risk Management
Social Capital	Access & Affordability
Social Capital	Customer Privacy
Social Capital	Customer Welfare
Social Capital	Data Security
Social Capital	Human Rights & Community Relations
Social Capital	Product Quality & Safety
Social Capital	Selling Practices & Product Labelling

Risk Factor ID: ESG risk attribution

The aim of our Risk Factor ID module is risk attribution. The attribution of the sources of industry risks is the first step we take to build a full picture of ESG risk exposure in private markets. The baseline of risk exposure of any asset is determined by the industry in which it operates. The risk exposure of a fund is determined by the industries in which the underlying assets of that fund operate. Similarly, the risk exposure of a GP is based on the exposure of the funds in the GP’s portfolio. To conduct the initial screening, we inspect the information on all the deals that remain *active*, made by a given fund. A deal is

classified as active if the underlying asset is still held in fund’s portfolio. Each deal entails an investment in a single industry. Each industry has multiple ESG risk factors that SASB assessed as *material*. This allows us to determine the list of all ESG risks that could likely materialize across all active deals as stakeholders’ cost, for a given fund. For each of those risks we count the number of deals, where a given risk is material for the underlying industry. The outcome informs us about the composition of ESG-related risks at a deal, fund, or fund manager level. It is presented as a heat-map.

Fig. 3: Example ESG Risk Attribution Module Illustrating the Aggregate Number of Active Portfolio Companies by Their SASB Risk Factors

Low  High

ENVIRONMENTAL		SOCIAL		GOVERNANCE	
SASB Factor	No. of deals	SASB Factor	No. of deals	SASB Factor	No. of deals
GHG Emission	5	Human Rights & Community Relations Rights	1	Supply Chain Management	6
Air Quality	1	Customer Privacy	11	Business Ethics	9
Energy Management	17	Data Security	16	Competitive Behaviour	7
Water & Wastewater Management	6	Access & Affordability	5	Management of the Legal & Regulatory Environment	0
Waste & Hazardous Materials Management	5	Product Quality & Safety	11	Critical Incident Risk Management	1
Ecological Impacts	1	Customer Welfare	7	Systematic Risk Management	10
Product Design & Life-cycle Management	11	Selling Practices & Product Labelling	7	Business Model Resilience	1
Materials Sourcing & Efficiency	7	Labor Practices	5		
Physical Impacts of Climate Change	4	Employee Health & Safety	5		
		Employee Engagement, Diversity & Inclusion	16		

Source: Preqin Pro

Industry Model

The starting point for obtaining a Risk Exposure Estimate for each portfolio firm is an Industry Risk Score. It is a proxy of general industry ESG risk, to which a given company is exposed. To assign Industry Risk Score to every company we implemented the following steps:

1. First, for each SASB factor that the ESG team assessed as relevant for private markets, we
 - a. Identified a variety of public sources of industry-level data. All these sources classified industries based on six-digit 'North American Industry Classification System (NAICS) codes'⁷ an established standard in industry taxonomy. They included NGOs, academic research, market regulators, international agencies, and the offices of national statistics
 - b. Utilized this data to create a single score for each SASB factor, encapsulating risk exposure across all the industries
2. Then, for each industry (in the NAICS taxonomy) we
 - a. Distinguished between the risk factors that are and that are not material according to SASB
 - b. The scores from 1b identified for a given industry as material were converted into numeric values in between 7.0 and 10.0.
 - c. The scores from 1b labelled as not material were converted into values in range from 2.0 to 7.0
 - d. If no raw data was available, we treated the underlying factor as binary. In this case we mapped it into 10.0 if the issue was labelled as material, and into 2.0 otherwise.
 - e. Aggregation of scores obtained in points bd for all the risk factors gave us the final risk exposure score at the industry level
3. To use these results, we mapped NAICS codes into Preqin industry classification.
4. Since each company on our platform is tagged to a single industry, this mapping enabled us to assign Industry Risk Score to each firm in every portfolio.

Geography model

Once we obtained Industry Risk Score Estimates for each portfolio company, we wanted to account for differences in regulatory, economic, and physical environment in which firms operate. This was the purpose of our auxiliary Geography Risk Score, calculated for countries and dependencies. To obtain a geographic risk proxy for every portfolio firm, we executed the following steps:

1. First, for each SASB factor relevant for private markets we
 - a. Identified a variety of public sources of country-level data. The selected sources included NGOs, academic research, market regulators, international bodies, and the offices of national statistics. All these sources classified countries and dependencies in a way that could be mapped into three-letter ISO3 codes – a unified taxonomy, promoted by [International Organization for Standardization \(ISO\)](#).
 - b. Utilized this data to create a single score for each SASB factor, encapsulating risk exposure across all the countries and dependencies. To assure that our geographic model is conformable, we used the same factors as in the industry risk model. Since no third party provides SASB risk factors at country level, these scores were calculated internally by the ESG team.
2. Then for each country or dependency (in ISO3 taxonomy) we
 - a. Converted these scores into numeric values in between 0.0 and 10.0.
 - b. Conducted a sequence of aggregations to generate thirty-five Geography Risk Scores across SASB factor, SASB pillar, E/S/G and overall ESG levels. The highest tier estimate gave us the final risk score at the country level.

3. To utilize these results, we mapped ISO3 codes into Preqin country classification.
4. Since each company on our platform has an identified single headquarters where applicable, this mapping enabled us to assign Geography Risk Score to each company in every portfolio.

The composition of our geographic dataset mirrors, to a considerable extent, the inputs used by other public rating providers that consider ESG risk rigorously. For instance, while there is no codified

metric measuring “Human Rights & Community Relations” risk exposure at the country level, academics have amassed an array of data points that Preqin could assess, correlate, and determine as likely to best represent that risk. These data points include *air and water quality, access to nutrition, labor-rights and health care access, modern slavery, and poverty ratios*. We removed other seemingly viable variables due to narrow country coverage, quality issues and cross-correlation with other data.

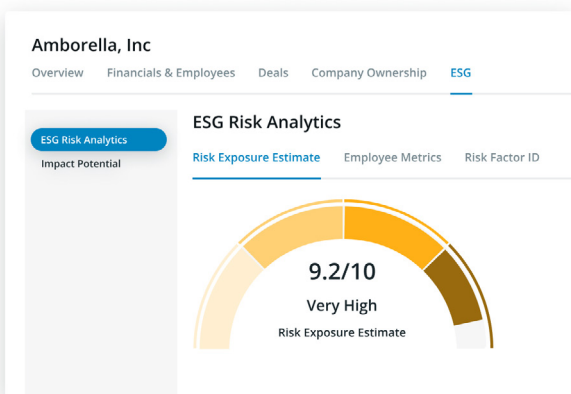
Modifying industry risk with geography: ESG Risk Exposure Estimate

After we obtained 54 Industry Risk Scores and 221 Geography Risk Scores, the last step was to combine the two and generate Risk Exposure Estimate. It starts with a measure of universal industry risk. Next, we adjust this measure by up to account for regulatory, economic, and physical environment. This modifier is based on firm’s headquarters location. We calculate it using these formulas:

Risk Exposure Estimate=f(Industry Risk Score x[1+ Geography Risk Modifier]),

$$\text{Geography Risk Modifier} = \frac{\text{Geography Risk Score } 5.0}{10.0}$$

Function $f(x)=\max(0.0,\min(x,10.0))$ above guarantees that the outcome is bound between numeric 0.0 and 10.0. The result of this calculation is the Risk Exposure Estimate, which is composed of Industry Risk Score and Geography Risk Modifier. This modifier is typically moderate. For 70% of all the combinations of a country and an industry the difference between the baseline Industry Risk Score and the final Risk Exposure Score lies between 1 and +1. This framework allows us to obtain a proxy of ESG risk exposure for every firm in each portfolio. As a result, we can aggregate risk exposure scores associated with individual deals to fund level and fund manager firm level.



Data Update Process

Every time a deal is struck, our methodology is applied to a new company, if the company is private, and the risk exposure scores are being generated at the levels of portfolio company, fund portfolio, and fund manager. This is an ongoing process. After the deal is recorded and visible on [Preqin Pro](#), all the scores are updated by the beginning of the following week. The underlying model is scheduled for annual revisions, featuring enhancements and dataset additions. These updates will be announced through client communication. Our selection of data sources is meant to be organic in nature. Once they become available and run through our quality assurance, new studies and data will be incorporated into Preqin's risk assessment.

The process for updating data is a simple action tree:

- Issue relevance: in cases where SASB updates a material issue (via addition, removal, or redesign), review of underlying scoring methodology may be required;
- KPI updates: KPI-driven scores with updated data sources will be updated annually with new raw data, remapped and rescaled. This may require:
 - Changing industry designations/mapping (ie, "Home Repair Services" may adjust to an alternate NAICS code);
 - Filling data gaps (i.e., prior years have data, current year is missing data but can be interpolated, estimated, or chosen for removal);
 - Replacing data sets entirely (i.e., the source data is no longer updated, valid, or otherwise compromised).
 - New research: Research refreshes will be conducted each year to confirm the best available data is being used for each issue.
- QA: Data will be reviewed by the data science team at Preqin to identify outliers, issues, or algorithmic bias.
- Publication: Prior to publication of a new dataset, communications will be sent to clients with a summary of any relevant changes.

Company Metrics

Company ESG metrics are designed to provide a global foundation for key ESG KPIs demanded by the market for multiple frameworks, including SASB, ILPA, the Data Convergence Project, TCFD, the EU Taxonomy, and SFDR, among others. These metrics are estimates for more than 99% of portfolio companies as disclosed data does not yet exist in the industry. Where portfolio companies or GPs contribute proprietary information to our database, those numbers can be reflected in our aggregated benchmarks or in place of estimated data where permitted and pending Preqin update cycles.

The estimated company metrics currently available are:

- Carbon metrics
 - mT Scope 1 CO₂e
 - mT Scope 2 CO₂e
- Water withdrawal
 - Megaliters (Ml) water withdrawn
- Employee metrics
 - Net employee growth
 - Employee volatility

It is important to note these are each estimated using combinations of public market ESG data and/or alternative datasets. In the absence of meaningful data at scale, these are meant to be iterated upon and improved with either actual data or more complete datasets over time. At this time, the data is informational only and not used in assessment it is for clients to consider as a foundational benchmark, not an assessment, score, or validated data.

Carbon Metrics

Our carbon estimates rely on CDP data voluntary disclosures to CDP for Scope 1 and Scope 2 mT CO₂e for largely public market entities. We supplement the data set using World Bank data to generate geographic estimates on carbon efficiencies by country and adjust our output accordingly.

The model makes the following assumptions:

1. Carbon intensity on a per employee basis is linear in growth
2. There is a relationship between country-level emissions efficiency and company-level emissions efficiency
3. Private companies will emit carbon in a similar manner to large public companies on a per employee basis

These assumptions were made based on structural and data limitations they are known to Preqin, and our plan is to continually iterate to validate these assumptions over time. The process for estimating Carbon Metrics is outlined below:

1. Map CDP industries to NAICS
2. Collect employee counts for companies in CDP coverage
3. Generate Scope 1, Scope 2, and Scope 1+2 per employee numbers for CDP coverage
4. Derive median Scope 1, Scope 2, and Scope 1+2 per employee numbers for each industry,

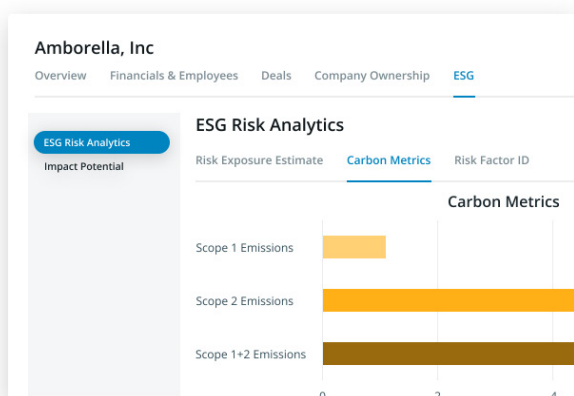
excluding outliers above the 95th and below the 5th percentiles

5. For samples less than 20 in an industry, roll up to a higher NAICS digit and derive the median
6. Generate a geography adjustment:
 - a. Using World Bank data on CO₂ emissions per capita, rank countries by carbon emission efficiency
 - b. Using a maximum/minimum transform, constrain adjustment between 80% and 120% of industry median
7. For each asset, multiply the mapped industry median by the headquarters geography adjustment factor
8. Multiply the adjusted per employee carbon intensity by the number of employees to generate a final estimate of metric tonnes

The result is, for nearly all companies in our database, an estimate of Scope 1 mT CO₂e, Scope 2 mT CO₂e, and Scope 1+2 mT CO₂e.

How to read it?

1,234 mT Scope 1 CO₂e Preqin estimates the asset, based on its industry and country of headquarters, emitted 1,234 mT of CO₂ equivalent in the last year, with an estimate using public market data and country-level efficiency metrics.



Water Metrics

Our water estimates rely on CDP data voluntary disclosures to CDP for megaliters (ML) of water withdrawn for largely public market entities. We supplement the data set using World Bank data to generate geographic estimates on water efficiencies by country and adjust our output accordingly.

The model makes the following assumptions:

1. Water intensity on a per employee basis is linear in growth
2. There is a relationship between country-level water efficiency and company-level water efficiency
3. Private companies will withdraw water in a similar manner to large public companies on a per employee basis

These assumptions were made based on structural and data limitations they are known to Preqin, and our plan is to continually iterate to validate these assumptions over time. The process for estimating Water Metrics is outlined below:

1. Map CDP industries to NAICS
2. Collect employee counts for companies in CDP coverage
3. Generate megaliter water withdrawals per employee numbers for CDP coverage
4. Derive median megaliter water withdrawals per employee numbers for each industry excluding

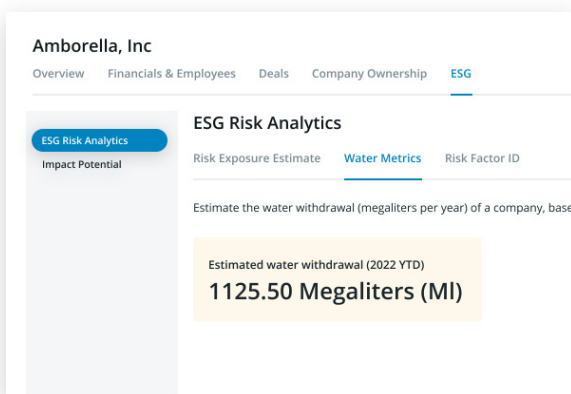
outliers above the 95th and below the 5th percentiles

5. For samples less than 20 in an industry, roll up to a higher NAICS digit and derive the median
6. Generate a geography adjustment:
 - a. Using World Bank data on GDP generated per metric cubed gallons of water used, rank countries by water efficiency
 - b. Using a maximum/minimum transform, constrain adjustment between 50% and 150% of industry median
7. For each asset, multiply the mapped industry median by the headquarters geography adjustment factor
8. Multiply the adjusted per employee water intensity by the number of employees to generate a final estimate of megaliters water withdrawn

The result is, for most companies in our database, an estimate of ML of water withdrawn.

How to read it?

123 ML water withdrawn Preqin estimates the asset, based on its industry and country of headquarters, withdrew 123 ML of water in the last year, with an estimate using largely public market data and country-level efficiency metrics.



Employee Metrics

Our employee metrics rely on a third-party provider’s data. The provider uses a number of social media and company inputs to generate estimates of employee inflows and outflows on a monthly basis.

The model makes the following assumptions:

1. The provider’s employee inflow and outflow estimates are reliable.
2. Gaps in the provider’s estimates can be interpolated.
3. Time series data encompassing less than a full year of inflows and outflows can be annualized.

We calculated two key metrics using the provider’s employee estimates where available across our asset database:

- Employee Net Growth: the net change in employee number on an annualized basis
- Employee Volatility: the gross change in employee number on an annualized basis, an approximation of employee turnover rates.

To generate each metric, we calculated the average number of employees on an annual basis using the following equation:

$$\sum_{i=i_{min}}^{i_{max}} Monthly\ Number\ Employees_i \times \frac{1}{(1 + i_{max} - i_{min})} \quad 1 \leq i \leq 12$$

The output from this formula provides the denominator for both Employee Net Growth and Employee Volatility. The numerator for Employee Net Growth is calculated as follows:

$$\sum_{i=i_{min}}^{i_{max}} Inflow_i - Outflow_i \times \frac{1}{(1 + i_{max} - i_{min})} \times i_{range} \quad 1 \leq i \leq 12, \quad i_{range} = 12$$

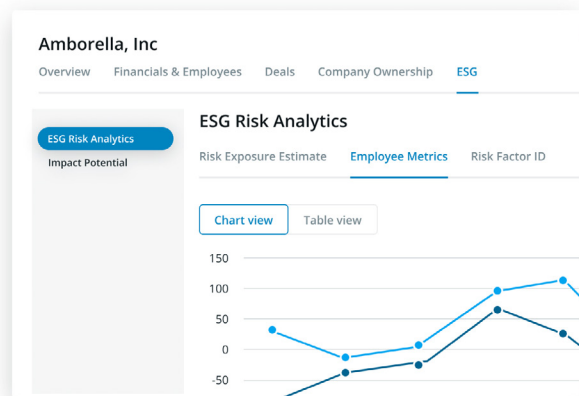
And the numerator for Employee Volatility is calculated as follows:

$$\sum_{i=i_{min}}^{i_{max}} Churn_i \times \frac{1}{(1 + i_{max} - i_{min})} \times i_{range}$$

$$1 \leq i \leq 12, \quad i_{range} = 12$$

$$Churn = ||Total\ Annual\ Inflow + Total\ Annual\ Outflow||$$

Employee Net Growth is the net growth of employees as a proxy for company growth or employee morale. Employee Volatility is best described using an analogy imagine a cube farm of employees in year X. Employee Volatility is the percentage of those employees that are either new or gone in year X+1. Employee Volatility represents potential high volatility can result in high turnover and employee replacement costs, lack of cohesion or team unity, growing pains, or other issues that can demand strong employee management.



Introducing Impact Potential

While the definitions of positive impact can vary substantially from methodology to methodology or from asset to asset, Preqin defines it as producing both a social and/or environmental benefit alongside financial returns. Assessing impact can be a deeply idiosyncratic exercise, with specific and unscalable data points generated to illustrate the creation or influence of positive externalities⁸. For instance, impacts such as the reduction of prison inmate populations or the increase in water and sanitation in under-served regions and communities are measurable with data points largely unscalable or assessable across a portfolio.

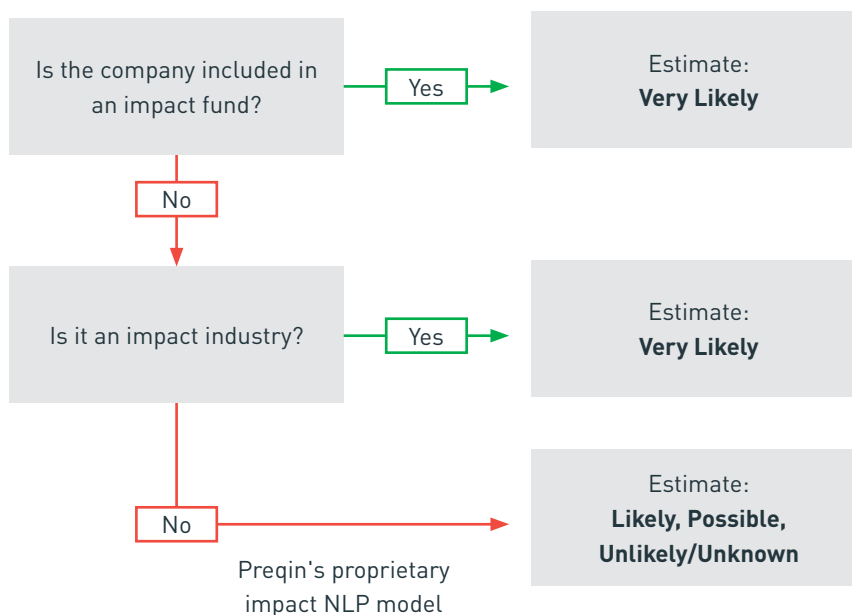
Frameworks such as the UN Sustainable Development Goals (UN SDGs) are important for outlining impact goals, but they provide little insight as to how to identify assets that provide impact or how to reasonably measure them from a corporate standpoint. This, inherently, is the impact challenge – how do you measure a broader set of impacts?

Our impact product focuses on identifying and estimating the size of an asset’s impact potential, rather than measuring direct impact. We leverage GP-disclosed impact funds, Preqin’s granular industry taxonomy, and a conservative Natural Language Processing (NLP)⁹ impact estimation model to answer a simple question: How likely is it that a particular asset could produce positive externalities/impact?

Our Impact Potential follows a three-step process to classify private companies in the Preqin database along four “probabilities”: Very Likely, Likely, Possible, or Unlikely. Each “probability” suggests the chances the particular asset will or does produce some positive externality. To identify impact probability, we have done the following:

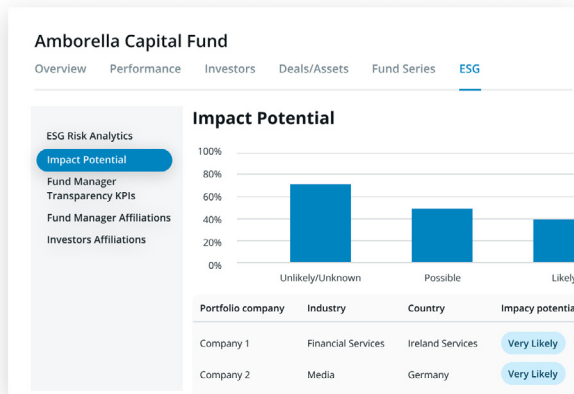
⁸ Economic term that describes the situation in which the consumption or production of a good or service causes a benefit to a thirdparty not directly involved in the market transaction.

⁹ Natural Language Processing is the application of computational techniques to the analysis and synthesis of natural language and speech



The result comes in the shape of one estimated likelihood for each private company on the Preqin Pro platform, which is then rolled up to the fund label, based on the funds' underlying assets, and then rolled up again to the GP level, based on the manager's funds.

Impact Potential at the fund level:



Impact Potential at the GP level:

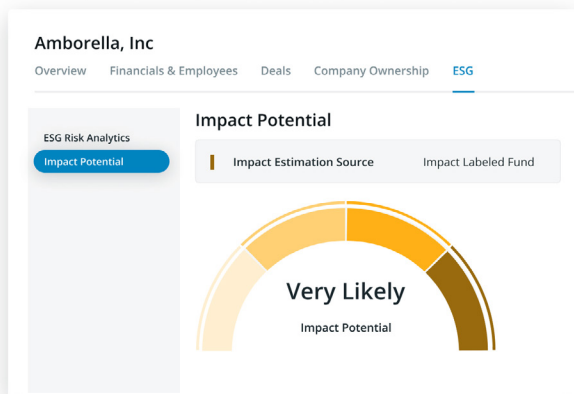
Amborella Capital, Inc.
Overview Contacts Investment Strategy Funds/Performance **ESG**

Transparency KPIs
 ESG Risk Analytics
Impact Potential
 Affiliations
 Key ESG Contacts

Impact Potential

Fund name	Vintage year	No of portfolio companies	Unlikely/Unknown impact (%)
Amborella Fund 1	2021	4	0
Amborella Fund 2	2020	14	14
Amborella Fund 3	2019	33	40

Impact Potential at the private company level:



The Step-by-Step

Step 1: Identify assets already in known impact funds

As highlighted earlier, Preqin ESG Solutions identifies funds labeled as impact by the GPs from public and private disclosures. The investment philosophy of these funds is to invest with the intention to generate positive, measurable social and environmental impact alongside a financial return. We are using this fund label to identify the assets in which the funds have allocated resources under the assumption that the impact potential of the underlying assets has been evaluated by the GP's investment team.

If a private company asset in our database has been tagged as an impact fund, that asset is considered "Very Likely" to produce positive impact. We do not identify a particular data point in support of that impact, nor do we assess the scale of the impact. We tag the asset as having been identified by a fund manager as an impact fund.

Step 2: Identify assets in known impact industries

Similarly, by overlaying Preqin's [industry taxonomy](#) with the impact funds dataset, we could identify sectors in which 100% of the assets have been considered "Very Likely" impact assets as described in step 1. These sectors include renewable energies, micro-finance, education, or health verticals that tend to target new or un-derserved markets.

Step 3: Leverage Natural Language Processing (NLP) to identify potential impact assets

For the remaining assets, we leverage NLP to identify their impact potential. This process involves two steps.

- a. We used collateral from the UN SDG's website and official documentation to generate a list of keywords correlated with impact. We scored each keyword based on its frequency throughout the SDGs objectives.
- b. We analyzed the company descriptions in the Preqin database searching for matches with the keywords and scores from the previous step.

The result is an "impact potential" score for each of the private company assets in Preqin Pro. This is best explained using an example. Below is the description of a company that is not included in either an impact fund or impact-related industry, therefore following the first two steps of our impact potential estimation model the result would have been "Unlikely/Unknown" potential, however, when analyzing the company's description, we find that it contains SDG keywords that can be assessed using the NLP model:

"...a British luxury sustainable fashion brand. The company started with handbags made from up-cycled bottle tops in Kenya lined with leather offcuts. Through a collaboration the company got recognized internationally, supporting artisans and funding health education for young people in Africa. The company opened the world's first zero waste store. The company conducts atelier and training programs in Brazil and Nepal and continue to source the finest sustainable and up-cycled materials in challenged parts of the world. The company supports health, education and skills training projects through their foundation founded in 2002. The company offers a wide variety of accessories to customers like cross-body bags, shoulder bags, tote bags, backpacks, clutches and mini bags, phone purses, belts, bag straps, flower clips, masks, scarves, bracelets etc. These accessories are categorized under different types of collection names like classic collection, new naturals, peace collection and edition collection. The company also offers various types of discounts on its products like summer sale. The company's creations are solely made out of sustainably sourced materials like zero deforestation leather, discarded aluminum ring pulls and up-cycled plastic yarn. The zero deforestation leather is called so as it is sourced from sustainable farms and certified tanneries that ensure that their operations have zero deforestation impact on the rainforests. Even the packaging of the products are plastic free and made out of recycled cardboard material."

The above description contains multiple keywords highly correlated to SDG-related collateral.

To remain conservative, however, we capped the NLP model assessments to “Likely”, “Possible”, or “Unlikely / Unknown”.

- Top quartile in similarity score to UN SDG collateral produces a “Likely” assessment.
- Second quartile in similarity score to UN SDG collateral produces a “Possible” assessment.
- Else, produces a “Unlikely/Unknown” assessment.

Appendices

Appendix A: Initial Pool of ESG Indicators Assessed for the Transparency KPIs

This list includes all data points used as starting point in product creation, except the ones sourced from public market ESG ratings providers to redistribution restrictions.

Original Data Indicator	Source
Describe your approach to disclosing and following up on material ESG incidents to your LPs	ILPA
Does the Firm have a Code of Conduct that covers harassment, discrimination, and/or workplace violence?	ILPA
Does the Firm have a Family Leave policy?	ILPA
Does the Firm have a formal Diversity and Inclusion policy or initiative?	ILPA
Does the Firm have a formal mentor-ship program for minorities and/or women?	ILPA
Does the Firm have a written policy on the handling and safeguarding of any material, non-public information?	ILPA
Does the Firm obtain Environmental Impact Studies for each of its portfolio company and property investments?	ILPA
Does the Firm require such a Code of Conduct at its portfolio companies?	ILPA
Does the Firm track the gender composition of employees taking family leave benefits? If 'yes', provide a summary of employees that have taken family leave in the past three years	ILPA
Does the Firm work with organizations that promote the attraction and retention of women and minorities within private equity?	ILPA
Has the Firm adopted the CFA Institute's most recent Code of Ethics and Standards of Professional Conduct or substantive equivalent?	ILPA
Has the Firm put procedures in place for the reporting and investigation of harassment and/or discrimination?	ILPA
Have there been any claims of sexual or general harassment, misconduct, or discrimination against any current or former Firm employees (while employed by the Firm) within the past five years?	ILPA
Identify trends to inform pipeline development	ILPA
Integrate ESG metrics into company management and reporting	ILPA
Is the Firm a registered investment advisor or broker-dealer?	ILPA
Would you be willing to begin tracking this information within one year?	ILPA
Would you be willing to develop and implement a policy or initiative within one year?	ILPA
Would you be willing to develop and implement such a code within one year?	ILPA
Would you be willing to develop and implement such a policy within one year?	ILPA
Would you be willing to establish and communicate procedures within one year?	ILPA
Would you be willing to require such a code at the Firm's current/future portfolio companies within one year?	ILPA
Communicate effective management of operationally relevant ESG factors leading to strength of enterprise value	SASB
Consider key ESG factors in due diligence	SASB
Define GP's view of Materiality	SASB
Establish ESG Policy	SASB
Use ESG data to inform LP monitoring	SASB

Original Data Indicator	Source
Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management	TCFD
Describe the organization's processes for identifying and assessing climate-related risks	TCFD
Describe the organization's processes for identifying climate-related risks	TCFD
Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets	TCFD
Did they company set a carbon target?	TCFD
Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks	TCFD
Disclose the climate-related risks and opportunities the organization has identified over the short, medium, and long term	TCFD
Disclose the climate-related risks and opportunities the organization has identified over the short, medium, and long term	TCFD
Disclose the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	TCFD
Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process	TCFD
Disclose the resilience of the organization's strategy, taking into consideration different climate-related scenarios including a 2°C or lower scenario.	TCFD
Disclose the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario	TCFD
Disclose the role of management in assessing and managing climate-related issues	TCFD
Disclose the role of the board of the organization in overseeing climate-related issues	TCFD
Does the company aim to use clean sources of energy?	TCFD
Does the company disclose to CDP?	TCFD
AFIC – La Commission ESG	UNPRI
American Investment Council (ESG guidelines)	UNPRI
Asian Corporate Governance Association	UNPRI
Australian Council of Superannuation Investors	UNPRI
Business for Social Responsibility (BSR)	UNPRI
BVCA – Responsible Investment Advisory Board	UNPRI
CDP Climate Change	UNPRI
CDP Forests	UNPRI
CDP Water	UNPRI
CFA Institute Centre for Financial Market Integrity	UNPRI
Code for Responsible Finance in the 21st Century	UNPRI
Code for Responsible Investment in SA (CRISA)	UNPRI
Council of Institutional Investors (CII)	UNPRI
Dedicated ESG staff?	UNPRI
Discloses a post-investment ESG policy	UNPRI
Discloses a pre-investment ESG policy	UNPRI
Does the company have an ESG policy?	UNPRI
Energy AUM	UNPRI
ESG due diligence reporting lines	UNPRI
ESG Research Australia	UNPRI
Eumedion	UNPRI
Extractive Industries Transparency Initiative (EITI)	UNPRI

Original Data Indicator	Source
Frequency of ESG strategy reviews	UNPRI
Fund offerings sold as "ESG" or "ESG-themed" funds	UNPRI
Global Impact Investing Network	UNPRI
Global Investors Governance Network (GIGN)	UNPRI
Global Real Estate Sustainability Benchmark (GRESB)	UNPRI
Green Bond Principles	UNPRI
Hedge fund and stakes	UNPRI
How is your ESG policy applied?	UNPRI
How is your ESG policy applied?	UNPRI
Infrastructure AUM	UNPRI
Institutional Investors Group on Climate Change (IIGCC)	UNPRI
Interfaith Center on Corporate Responsibility (ICCR)	UNPRI
International Corporate Governance Network (ICGN)	UNPRI
International Integrated Reporting Council (IIRC)	UNPRI
Invest Europe Responsible Investment Roundtable	UNPRI
Investor %: Corporate	UNPRI
Investor %: Endowment	UNPRI
Investor %: Family Office / HNW	UNPRI
Investor %: Financial Institutions	UNPRI
Investor %: Fund of Funds	UNPRI
Investor %: Insurance	UNPRI
Investor %: Public Pension & Agency	UNPRI
Investor Group on Climate Change, Australia/New Zealand (IGCC)	UNPRI
Is ESG considered in specific asset classes or across asset classes?	UNPRI
Local Authority Pension Fund Forum	UNPRI
Market breakdown: DM	UNPRI
Market breakdown: EM	UNPRI
Market breakdown: Frontier	UNPRI
Market breakdown: Other	UNPRI
Offers investment fund targeting ESG opportunities linked to SDGs	UNPRI
Operating Principles for Impact Management	UNPRI
PE AUM	UNPRI
Principles for Responsible Investment (PRI)	UNPRI
Principles for Sustainable Insurance	UNPRI
Public market credit	UNPRI
RE AUM	UNPRI
Regional or National Social Investment Forums (e.g. UKSIF, Eurosif, ASRIA, RIAA), specify	UNPRI
Responsible Finance Principles in Inclusive Finance	UNPRI
Shareholder Association for Research and Education (Share)	UNPRI
Sustainability Accounting Standards Board	UNPRI
Total AUM	UNPRI
Total AUM subject to ESG due diligence	UNPRI
Total AUM targeting ESG	UNPRI
Total AUM targeting SDGs	UNPRI
United Nations Environmental Program Finance Initiative (UNEP FI)	UNPRI

Original Data Indicator	Source
United Nations Global Compact	UNPRI
Describe your process for identifying and understanding (i) potentially material ESG risks, and (ii) ESG-related opportunities during due diligence.	UNPRI DDQ
Discloses ESG reporting and monitoring in portfolio companies	UNPRI DDQ
Do you commit to any international standards, industry (association) guidelines, reporting frameworks, or initiatives that promote responsible investment practices?	UNPRI DDQ
Do you make formal commitments relating to ESG integration in fund formation contracts, Limited Partnership Agreements, or in side letters when requested by investors?	UNPRI DDQ
Do you measure whether your approach to ESG factors has affected the financial and/or ESG performance of your investments? If yes, please describe how you are able to determine these outcomes.	UNPRI DDQ
Do you provide training, assistance, and/or external resources to your staff to help them understand and identify the relevance and importance of ESG factors in investment activities? If so, please describe what level of training is provided.	UNPRI DDQ
Do you systematically incorporate ESG considerations into preparations for exit? If yes, please describe your approach. If not, please explain why.	UNPRI DDQ
During deal structuring, what is the process for integrating ESG-related considerations into the deal documentation and/or the post-investment action plan?	UNPRI DDQ
Give two to three examples of how you have contributed to portfolio companies' management of ESG factors. Specify which initiative(s) you worked with management to identify and instigate, which you supported your portfolio company to achieve (and how) and/or what the portfolio company was already doing that you identified as existing good practice.	UNPRI DDQ
How are ESG risks and/or ESG-related opportunities reported to, considered, and documented by the ultimate decision making body, such as the Investment Committee?	UNPRI DDQ
How do you assess that adequate ESG-related competence exists at the portfolio company level? How do you ensure that portfolio company management devotes sufficient resources to manage ESG factors that have been identified?	UNPRI DDQ
How do you define the materiality of ESG factors? Please give two to three examples of ESG factors that you have identified as material to portfolio companies in your most recent fund.	UNPRI DDQ
How do you use your interaction with the board to influence the portfolio company's management of ESG factors?	UNPRI DDQ
Is the management of ESG factors included on the agenda of the Limited Partners Advisory Committee and/or Annual General Meeting?	UNPRI DDQ
Once identified, how might (i) potentially material ESG risks, and (ii) ESG-related opportunities impact the investment decision?	UNPRI DDQ
Please describe how (i) oversight responsibilities, and (ii) implementation responsibilities for ESG integration are structured within your organization. Please list the persons involved and describe their role, position within the organization, and how they are qualified for this role. Please also describe any external resources you may use.	UNPRI DDQ
Upon investing in a company, would you review existing compliance with sustainability or ethical business guidelines, or introduce new guidelines if necessary?	UNPRI DDQ
What is the current implementation status of your responsible investment policy? Do you have any firm plans to develop your approach toward the management of ESG factors?	UNPRI DDQ
What monitoring processes would you have in place to assess portfolio companies' management of ESG factors?	UNPRI DDQ
Which channels do you use to communicate ESG-related information to LPs? Can you provide samples of ESG-related disclosures from an earlier fund? If not, please indicate whether you would consider introducing ESG-related disclosures.	UNPRI DDQ

Appendix B: ESG Transparency KPIs

Indicator	Key Question	Indicator Applicability	Governance Type	ESG Pillar	Theme	Framework
The ownership structure of the GP	Does the GP disclose who owns the firm?	GP	Firm	Governance	Corporate Governance	Ratings Providers
Registered investment advisor or a registered broker dealer status	Is the firm registered as an investment advisor (in any country)?	GP	Firm	Governance	Corporate Governance	ILPA
General partner firm-level governing, leadership, or executive bodies, including the board of directors	Does the firm disclose the board members or C-level staff?	GP	Firm	Governance	Corporate Governance	Ratings Providers
Female representation on the board of directors	Does the firm disclose that there are females are on the board of directors?	GP	Firm	Governance	Corporate Governance	Ratings Providers
Any mention of ESG consideration in operations	Does the firm mention any consideration of ESG?	GP	Firm	Governance	Corporate Governance	SASB
A code of conduct policy for employees	Does the firm have a code of conduct?	GP; LP	Firm	Governance	Management of the Legal & Regulatory Environment	ILPA
An insider trading policy	Does the firm have an insider trading policy?	GP	Firm	Governance	Management of the Legal & Regulatory Environment	Ratings Providers
An anti-money laundering and/or "know your client" (AML KYC) policy	Does the firm have an anti-money laundering/know your client (AML KYC) policy?	GP	Firm	Governance	Management of the Legal & Regulatory Environment	Ratings Providers

Indicator	Key Question	Indicator Applicability	Governance Type	ESG Pillar	Theme	Framework
A whistle-blower or anonymous incident reporting process	Does the firm have a whistle-blower policy or procedure?	GP	Firm	Governance	Management of the Legal & Regulatory Environment	Ratings Providers
A modern slavery or human rights policy	Does the firm have a modern slavery policy?	GP	Firm	Social	Labor Practices	Ratings Providers
Adherence to any ISO standards	Does the firm mention that it adheres to any ISO standards?	GP	Firm	Social	Data Security	Ratings Providers
General partner firm-level privacy policy	Does the firm have a privacy policy?	GP	Firm	Social	Data Security	Ratings Providers
A formal diversity policy or initiative	Does the firm have a diversity and inclusion policy?	GP	Firm	Social	Employee Engagement, Diversity & Inclusion	ILPA
Discloses a public sustainability report	Does the firm publish a sustainability report?	GP; LP	Firm	Governance	Corporate Governance	Ratings Providers
Statements, policies, or initiatives related to climate change	Does the firm disclose any policy related to climate change, carbon or emissions?	GP; LP	Firm	Environmental	Corporate Governance	TCFD
General partner firm-level carbon or GHG emissions	Does the firm disclose their carbon or greenhouse gas (GHG) emissions?	GP	Firm	Environmental	Corporate Governance	Ratings Providers
Any mention of ESG consideration in investing	Does the firm mention consideration of ESG factors in its investment process?	GP; LP	Portfolio	Governance	Corporate Governance	SASB

Indicator	Key Question	Indicator Applicability	Governance Type	ESG Pillar	Theme	Framework
An investment policy that includes ESG issues	Does the firm have an ESG policy?	GP; LP	Portfolio	Governance	Corporate Governance	UNPRI
A policy detailing engagement processes with portfolio companies	Does the firm disclose an engagement policy with portfolio companies?	GP; LP	Asset	Governance	Post-Investment Process	Ratings Providers
An engagement process or considerations specifically focused on ESG issues with portfolio companies	If the firm has an engagement policy does this policy include ESG issues?	GP; LP	Asset	Governance	Post-Investment Process	Ratings Providers
The number of companies in the portfolio with whom engagements were conducted on ESG policies or issues	Does the firm disclose how many companies they have engaged with regarding ESG policies/issues?	GP	Asset	Governance	Post-Investment Process	Ratings Providers
ESG educational programs designed and run for portfolio companies	Does the firm provide education to portfolio companies about ESG issues?	GP	Asset	Social	Post-investment Process	Ratings Providers
A code of conduct policy for portfolio companies	Does the firm require portfolio companies to follow a code of conduct?	GP	Asset	Governance	Corporate Governance	ILPA
A policy specifying how ESG factors are used before investing in a company	Does the firm consider ESG factors before making an investment?	GP	Portfolio	Governance	Corporate Governance	UNPRI

Indicator	Key Question	Indicator Applicability	Governance Type	ESG Pillar	Theme	Framework
Evidence of environmental impact studies conducted on portfolio companies or properties	Does the Firm obtain environmental impact studies for each of its portfolio company and property investments?	GP	Asset	Environmental	Post-Investment Process	ILPA
A policy specifying how ESG factors are used after investing in a company or in company exits	Does the firm consider ESG factors after making an investment?	GP	Portfolio	Governance	Corporate Governance	UNPRI
Tracking of GHG emissions at portfolio companies	Does the firm track the emissions of portfolio companies/assets?	GP; LP	Asset	Environmental	Post-investment Process	Ratings Providers
ESG due diligence reporting lines	Does the firm disclose who is responsible for ESG at the firm at executive level?	GP; LP	Portfolio	Governance	Corporate Governance	UNPRI
Dedicated ESG investment staff	Does the firm have a dedicated ESG team?	GP; LP	Portfolio	Governance	Corporate Governance	UNPRI
Reporting or monitoring portfolio companies using ESG KPIs	Does the firm monitor ESG performance in their portfolio companies?	GP	Asset	Governance	Post-Investment	Ratings Providers
Total AUM disclosed as subject to ESG criteria or policies	What is the firm's AUM that is subject to ESG criteria?	GP; LP	Portfolio	Governance	Pre-Investment Process	UNPRI
A list of investors by type (i.e., "family office")	Does the firm mention the types of investors they work with?	GP	Portfolio	Governance	Business Model Resilience	UNPRI

Indicator	Key Question	Indicator Applicability	Governance Type	ESG Pillar	Theme	Framework
Total assets under management in ESG funds	What is the firm's AUM for ESG specific funds?	GP	Portfolio	Social	Post-Investment Process	UNPRI
Fund offerings sold as "ESG" or "ESG-themed" funds	Does the firm offer ESG-themed funds?	GP	Portfolio	Governance	Pre-Investment Process	UNPRI
Total assets under management in impact or SDG-related companies	Does the firm disclose their AUM targeting impact or SDG-related investments?	GP	Portfolio	Social	Post-Investment Process	UNPRI
Fund offerings sold as "Impact" or "SDG" funds	Does the firm offer impact funds?	GP	Portfolio	Governance	Pre-Investment Process	UNPRI
Investments in companies explicitly developing products in line with the UN Sustainable Development Goals	Has the firm invested in companies tied to the UN Sustainable Development Goals?	GP; LP	Asset	Social	Pre-Investment Process	Ratings Providers

Appendix C: ESG Transparency KPIs Disclosure Guidance

Indicator	Guidance
The ownership structure of the GP	Ownership structures specifically refer to whether the General Partner is publicly listed (if they have an investor relations section on their website or if they are listed on any global exchange and have a stock ticker, for instance) or if they list the owner(s) of the company.
Registered investment advisor or a registered broker dealer status	This specifically refers to whether the firm is regulated by a securities regulator, either as a registered investment advisor, broker, or other regulated entity that can legally give investment advice.
General partner firm-level governing, leadership, or executive bodies, including the board of directors	This is meant to simply capture the disclosure of any executives or governing bodies at the firm level. This may include disclosure of the board of directors, Chief Executive Officer or executive team, or any other firm leadership.
Female representation on the board of directors	Disclosure of the gender of members of a firm's board of directors or the breakdown of gender on the board by percentage which indicate the inclusion of at least one female board member. The amount of female representation on the board is immaterial in this instance, as we are assessing transparency and not firm performance. This may also be disclosed through board member photos, clearly indicating the existence of a female board member.
Any mention of ESG consideration in operations	Mention of ESG on a firm's website, policies, reports, or other collateral. This indicator is considered disclosed if any material suggests that the company is using ESG in some way, either in their portfolio management or in their own business operations, such as management of diversity or carbon emissions. This does not include philanthropy or CSR initiatives, but must specifically mention information about environmental risk management, labor risk management, or governance issues.
A code of conduct policy for employees	Disclosure of a code of conduct policy, which may take the form of an ethics code, bribery code, or other code of conduct that employees must abide by.
An insider trading policy	This is marked as disclosed if the firm specifically mentions the existence of an insider trading policy or discloses the policy itself. This policy or mention of its existence may be included within a disclosed Code of Conduct policy, for example.
An antimoney laundering and/ or "know your client" (AML KYC) policy	This is marked as disclosed if the firm specifically mentions the existence of an antimoney laundering, "know your client" (KYC) policy or discloses the policy itself.
A whistle-blower or anonymous incident reporting process	This is marked as disclosed if the firm specifically mentions the existence of a whistle-blower policy or discloses the policy itself. This may include a whistle-blower or anonymous hotline for reporting breaches in conduct, or another system for reporting internal issues anonymously.
A modern slavery or human rights policy	This is marked as disclosed if the firm specifically mentions the existence of a modern slavery, human trafficking, or human rights policy or discloses the policy itself. This may also include policies applicable to parent or subsidiary companies.
Adherence to any ISO standards	ISO standards are specific standards set by the International Organization for Standardization. A full list of standards is available here . The firm may adhere to any ISO standard for this indicator to be considered disclosed.
General partner firm-level privacy policy	This is marked as disclosed if the firm specifically mentions the existence of a privacy policy or discloses the policy itself, including those of parent company. This will also be considered disclosed if a firm adheres to ISO standards or JIS Q standards related to privacy, data protection or data management.
A formal diversity policy or initiative	This is marked as disclosed if the firm specifically mentions the existence of a diversity policy or discloses the policy itself. This can include a formal policy, an actual initiative or target for inclusion in hiring, a process to hire more diverse candidates, or adoption of a third-party policy on diversity.
Discloses a public Sustainability Report	This is marked as disclosed if the firm has released a sustainability, corporate responsibility, CSR, ESG, socially responsible, impact, or other ESG / impact-related report within in the past two years. This may include UNPRI Public Signatory Reports.
Statements, policies, or initiatives related to climate change	This is marked as disclosed if the firm discloses any statements, policies, or initiatives related to climate change, carbon, or emissions. This is related to the company itself, which may include statements regarding the risks of climate change, announced initiatives to measure or manage climate risk as part of a firm's business model or investment strategy, or disclosure of a carbon or climate change-related policy.

Indicator	Guidance
General partner firm-level carbon or GHG emissions	This is marked as disclosed if the firm discloses their Scope 1, Scope 2 and/or Scope 3 GHG emissions. This must include numerical figures, generally recorded in tons. Additionally, this indicator will also be considered disclosed if a firm adheres to ISO14064, as this is the international standard for disclosure.
Any mention of ESG consideration in investing	Mention of ESG consideration in a firm's investment process. This may include the disclosure of an ESG policy or any mention of ESG as a factor, consideration, or potential risk or opportunity in investing.
An investment policy that includes ESG issues	Any disclosed investment policy that mentions the consideration of ESG in investing. This specifically refers to an investment policy that extends beyond ESG in firm operations.
A policy detailing engagement processes with portfolio companies	Disclosure of an engagement policy that details a general engagement process with portfolio companies on any topic or issue. This must include evidence of a process or issue that exemplifies how engagement happens.
An engagement process or considerations specifically focused on ESG issues with portfolio companies	Disclosure of an engagement policy that details a engagement process with portfolio companies on ESG specific issues. This must include evidence of a process or issue that exemplifies how engagement happens. ESG issues may include any environmental issues (waste, water, energy, pollution, carbon, regulatory fines for environmental damage, etc), social issues (employees and employee management, social protests, religious issues, etc), or governance issues (management team composition, leadership structure, business ethics or codes of conduct, bribery, corruption, etc).
The number of companies in the portfolio with whom engagements were conducted on ESG policies or issues	Disclosure of the number of companies that were reviewed for ESG issues or against an ESG policy either before or after investment. This does not necessarily need to include what they were reviewed for as long as it specifies, even generically, "ESG issues" or "ESG" as the basis for review.
ESG educational programs designed and run for portfolio companies	The existence of any formal educational programs designed for portfolio companies that address ESG issues. This may include portfolio company trainings offered by the GP on topics such as workforce management, environmental law, corporate structures, stakeholders, diversity and inclusion, or anything else related to ESG.
A code of conduct policy for portfolio companies	Disclosure of a code of conduct explicitly stated as applicable to portfolio companies. This may take the form of an ethics code, bribery code, or other code of conduct that employees must abide by.
A policy specifying how ESG factors are used before investing in a company	Disclosure of a policy specific to pre-investment due diligence that includes the consideration of ESG factors before making an investment, the application of an exclusionary policy, or the consideration of environmental or social impacts of portfolio companies before investing.
Evidence of environmental impact studies conducted on portfolio companies or properties	This is marked as disclosed if the firm mentions that they conduct environmental impact studies before investing in portfolio companies, while holding and engaging with portfolio companies, or as part of typical portfolio company exits. Environmental impact studies may include pollution studies, emissions studies, or any other study that is related to the environment as part of investing. This must specifically be a study conducted on one or more of the companies in which they invest, going beyond the mere consideration of environmental impacts of their portfolio companies.
A policy specifying how ESG factors are used after investing in a company or in company exits	Disclosure of a policy specific to post-investment processes that includes ESG engagements, tracking ESG factors, and/or how ESG is considered when exiting an investment.
Tracking of GHG emissions at portfolio companies	This is marked as disclosed if the firm mentions that they track Scope 1, Scope 2 and/or Scope 3 GHG emissions of their portfolio companies. This may include numerical figures or any mention of tracking carbon or emissions.
ESG due diligence reporting lines	Disclosure of who is ultimately responsible for enforcing ESG policy, ESG reviews, ESG oversight, or other ESG procedures in the investment process. This includes designated groups, parties, or people inside the company responsible for overseeing ESG. This will also be considered disclosed if an executive team is also an ESG team. Otherwise, the reporting lines and ultimate ESG authority must be disclosed.
Dedicated ESG investment staff	Disclosure of any staff members specifically dedicated to implementing ESG policies, strategies, and procedures in the investment process. This may be a dedicated business unit, team, or individual.

Indicator	Guidance
Reporting or monitoring portfolio companies using ESG KPIs	This is marked as disclosed if the firm mentions that they monitor ESG performance, or any specific ESG issues (i.e., carbon emissions, workforce performance, board diversity and makeup, environmental law compliance, etc), in their portfolio companies. Although we are at a base level assessing proof of concept, actual metrics may also be disclosed.
Total AUM disclosed as subject to ESG criteria or policies	Disclosure of a currency amount of assets under management that are subject to ESG policies or assessment. If a disclosed ESG Policy explicitly states its applicability to total AUM, this will also be considered disclosed. Otherwise, this must be numerical.
A list of investors by type (i.e., "family office")	Disclosure of a basic list of client types, often included in UNPRI Public Signatory Reports.
Total assets under management in ESG funds	Disclosure of a currency amount of assets under management in ESG funds. This must be numerically disclosed and the fund must be explicitly ESGdirected and not solely subject to ESG criteria or policies.
Fund offerings sold as "ESG" or "ESGthemed" funds	This is marked as disclosed if the firm discloses any fund marketed as an ESG fund. This also includes ESGthemed funds or funds devoted to impact. Examples may include a "low carbon" fund, a quality governance fund, or a water fund. This refers specifically to entire funds, excluding individual ESGoriented company investments.
Total assets under management in impact or SDGrelated companies	Disclosure of a currency amount of assets under management that explicitly target impact or the <u>UN Sustainable Development Goals</u> . If the firm's only directive is impact or SDG investing, this will also be considered disclosed, otherwise, this must be numerical.
Fund offerings sold as "Impact" or "SDG" funds	Any fund offerings marketed as Impact or aligned with the UN Sustainable Development Goals.
Investments in companies explicitly developing products in line with the UN Sustainable Development Goals	Disclosure of individual investments in portfolio companies tied to the Sustainable Development Goals, clearly stated as such.

Appendix D: ESG-Related Affiliations and Initiatives

The UN Principles for Responsible Investment (UNPRI or PRI)

The PRI is a United Nations-supported international network of investors. Through committing to six aspirational principles, the signatories of the PRI work together to support the integration of ESG in investment decisions and create a more sustainable global financial system.

Task Force on Climate-related Financial Disclosures (TCFD)

The TCFD was created by the G20 Financial Stability Board to facilitate and improve reporting of climate-related financial information. It provides a set of disclosure recommendations to support informed capital allocation, and enhance market participants' understanding of material climate-related risks and opportunities. The recommendations focus on four core areas: 1. Governance: the organization's governance around climate-related risks and opportunities. 2. Strategy: the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy and financial planning. 3. Risk management: the processes used by the organization to identify, assess and manage climate-related risks. 4. Metrics and targets: the metrics and targets used to assess and manage relevant climate-related risks and opportunities.

Sustainability Accounting Standards Boards (SASB)

SASB is a non-profit organization providing a set of industry-specific disclosure standards across ESG topics. The standards are available across 77 industries, and identify the most relevant ESG issues to financial performance in each industry. Alongside the SASB Materiality Map, these standards help investors determine which ESG issues are material for reporting as well as helping facilitate more standardized benchmarking.

Global Impact Investing Network (GIIN)

GIIN is a global network of investors, focusing on reducing barriers to impact investment by building critical infrastructure and developing activities, education and research to facilitate the development of a coherent impact investing industry.

Global Reporting Initiative (GRI)

The GRI is a global reporting initiative. Through the GRI Standards, they provide guidance on ESG disclosures for investors and other stakeholders.

Global ESG Benchmark for Real Assets (GRESB)

GRESB is an investor-led organization providing standardized ESG data to capital markets. It is considered the leading ESG benchmark for real estate and infrastructure investments.

CDP

CDP (formerly known as the Carbon Disclosure Project) is a non-governmental organization (NGO) supporting companies, financial institutions and cities in disclosing and managing their environmental impact. It runs a global environmental disclosure system in which nearly 10,000 companies, cities, states and regions report on their risks and opportunities related to climate change, water security and deforestation.

Climate Disclosure Standards Board (CDSB)

The CDSB is an international consortium of businesses and environmental non-governmental organizations (NGOs) committed to advancing and aligning the global mainstream corporate reporting model to equate natural capital with financial capital.

Sustainable Development Goals (SDGs)

The SDGs are a set of 17 global goals, established by the UN General Assembly in 2015. The goals address key global challenges, covering issues such as poverty, inequality, climate change, environmental degradation, peace and justice. They are often referred to in the context of impact investing, as a framework for defining and assessing impact.

Institutional Limited Partners Association (ILPA)

ILPA is a global organization dedicated to advance the interests of limited partners and their beneficiaries through education, research, advocacy and events. Through their Due Diligence Questionnaire and Diversity Metric Template, they provide a standardized framework for integrating and monitoring ESG and DEI.

EU Sustainable Finance Action Plan

The EU Sustainable Finance Action Plan is the European Union's strategy for sustainable finance. It aims to reorient capital flows towards sustainable finance, manage financial risk stemming from ESG issues, and facilitate more transparency and long-termism in financial activities. The Plan consists of several components, including: 1. The EU Taxonomy: provides a framework for defining environmentally sustainable economic activities. It identifies three criteria an economic activity must satisfy to be considered sustainable, and a list of six environmental objectives. 2. The Sustainable Finance Disclosure Regulation (SFDR): imposes a set of disclosure requirements for asset managers and other financial market participants to provide standardized disclosures on how ESG factors are integrated at the entity and product level.

Net Zero Alliances

Net Zero Alliances include all those affiliations committed to supporting the goal of emitting net zero greenhouse gases by 2050 or sooner, aligned with the global effort to limit warming to 1.5 degrees Celsius. These include the Net Zero Asset Managers Initiative, Glasgow Financial Alliance for Net Zero, Net-Zero Asset Owner Alliance, Net-Zero Banking Alliance, Net Zero Investment Framework 1.0, Race to Zero, Paris Aligned Initiative Net Zero Asset Owner Commitment, amongst others.

Appendix E: Full List of Affiliations

- BVCA – Responsible Investment Advisory Board
- CDP Climate Change
- CDP Forests
- Global Impact Investing Network
- Global Real Estate Sustainability Benchmark (GRESB)
- Institutional Investors Group on Climate Change
- Principles for Responsible Investment (PRI)
- United Nations Environment Programme Finance Initiative
- United Nations Global Compact
- AFIC – La Commission ESG
- American Investment Council (ESG guidelines)
- Asian Corporate Governance Association
- Australian Council of Superannuation Investors
- AVCA: Sustainability Committee
- CDP Water
- Ceres
- CFA Institute Centre for Financial Market Integrity
- Climate Action 100+
- Code for Responsible Finance in the 21st Century
- Code for Responsible Investment in SA (CRISA)
- Council of Institutional Investors
- ESG Research Australia
- Eumedion
- Extractive Industries Transparency Initiative (EITI)
- Global Investors Governance Network (GIGN)
- Green Bond Principles
- HKVCA: ESG Committee
- Interfaith Center on Corporate Responsibility
- International Corporate Governance Network
- International Integrated Reporting Council (IIRC)
- Invest Europe Responsible Investment Roundtable
- Investor Network on Climate Risk (INCR)/CERES
- Local Authority Pension Fund Forum
- Net Zero Alliances
- Operating Principles for Impact Management
- Principles for Financial Action in the 21st Century
- Principles for Sustainable Insurance
- Regional or National Social Investment Forums (e.g. UKSIF, Eurosif, ASRIA, RIAA), specify
- Responsible Finance Principles in Inclusive Finance
- Shareholder Association for Research and Education (Share)

Appendix F: ESG Risk Analytics Data Sources and Data Understanding

SASB Issue	Score Type	Subscores Generated	Raw Data Sources	Reading the Score: High scores indicate...	Understanding the Risk
GHG Emissions	Geographic	Transition subscore; Regulatory subscore	Global Carbon Project; UN Comtrade; OECD; IMF;	...countries where due to economic dependencies or limited regulatory will to limit GHG emissions.	High emitting industries in countries with dependencies on GHG emitting business are likely to face higher long term regulatory and human burdens due to climate change.
	Industry	None	CDP; US EPA; Climatewatch;	...industries with high emissions relative to other industries as a byproduct of operations.	High emitting industries in countries with dependencies on GHG emitting business are likely to face higher long term regulatory and human burdens due to climate change.
Air Quality	Geographic	None	IHME; WHO;	...countries with high concentrations of particulate matter and/or decreased mortality.	High air pollutant industries in countries where existing particulate matter already generates significant human health risk are likely to face higher regulatory and health costs associated with those pollutants.
	Industry	None	NIH; US EPA;	...industries where air pollution rates are higher than other industries or where the cost of health of those pollutants are higher than other industries.	High air pollutant industries in countries where existing particulate matter already generates significant human health risk are likely to face higher regulatory and health costs associated with those pollutants.
Energy Management	Geographic	None	OECD;	...countries where the share of renewables in the energy mix is low.	Energy intense industries in countries with limited renewable energy resources are likely to face higher energy costs over the long term.
	Industry	None	EIA;	...industries where energy demands are high as an input to production.	Energy intense industries in countries with limited renewable energy resources are likely to face higher energy costs over the long term.
Water & Wastewater Management	Geographic	Water Management subscore; Water availability subscore	JMP; EPI; FAO; Lenzen et al (2013);	...countries with limited sanitation and centralized water management and/or limited water availability.	Industries where water is a key necessary input operating in countries with limited water availability or poor infrastructure risk community conflict, rationing, or supply issues.
	Industry	None	Blackhurst (2002); CDP;	...industries that are water intense relative to other industries.	Industries where water is a key necessary input operating in countries with limited water availability or poor infrastructure risk community conflict, rationing, or supply issues.
Waste & Hazardous Materials Management	Geographic	None	FAO; Lenzen et al (2020); Oita et al (2016);	...countries with NOX, SOX, or pesticide intense imports and production.	Industries where hazardous waste is a byproduct of operations in countries with high concentrations of waste in imports and production are at risk of regulatory shift and human health deterioration.
	Industry	None	US EPA; Eurostat;	...industries where hazardous material waste intensity is high.	Industries where hazardous waste is a byproduct of operations in countries with high concentrations of waste in imports and production are at risk of regulatory shift and human health deterioration.

SASB Issue	Score Type	Subscores Generated	Raw Data Sources	Reading the Score: High scores indicate...	Understanding the Risk
Ecological Impacts	Geographic	Protection gap subscore; Import risk subscore; Species risk subscore;	Birdlife International; Lenzen et al (2012); IUCN; Ocean Health Index; Curtis et al (2018); EPI;	...countries with limited protection of biodiverse sites with species threats linked to imports or where active mining of biodiverse areas for industry is conducted.	Industries that are highly polluting, including GHG emissions, particulate matter, water intense, or produce hazardous waste, operating in countries with limited protections of biodiversity face both biological system risk and regulatory change risk.
	Industry	None	CDP; US EPA; Climatewatch; NIH;Blackhurst (2002); Eurostat;	...industries that are highly polluting, either via air, water, or hazardous waste or in combination.	Industries that are highly polluting, including GHG emissions, particulate matter, water intense, or produce hazardous waste, operating in countries with limited protections of biodiversity face both biological system risk and regulatory change risk.
Human Rights & Community Relations	Geographic	Maslow subscore; Communal safety subscore;	FAO; UNDESA; World Data Lab; OECD; World Justice Project; WHO; UNICEF; Walk Free Foundation (2018);	...countries where basic needs are not met or highly inequal with limited social safety nets.	Industries where human rights issues recur in either operations or the supply chain operating in countries with limited access to basic needs and social safety face both reputational/brand risk, litigation risk, and market access risk.
	Industry	None	SASB;	...industries identified by SASB and ESG practitioners as facing material human rights risk.	Industries where human rights issues recur in either operations or the supply chain operating in countries with limited access to basic needs and social safety face both reputational/brand risk, litigation risk, and market access risk.
Customer Privacy	Geographic	Customer privacy legislation subscore; Mass surveillance subscore;	UN Conference on Trade and Development;	...countries lacking either existing or draft legislation or who conduct broad population surveillance.	Data intense industries with a history of breaches or breaking customer trust operating in countries with few consumer data protections face high customer and market access risk.
	Industry	None	McKinsey; Verizon; Ponemon Institute;	...industries that are data intense with a history of breaches or limited consumer trust.	Data intense industries with a history of breaches or breaking customer trust operating in countries with few consumer data protections face high customer and market access risk.
Data Security	Geographic	None	ITU; World Bank;	...countries with high populations with internet access and mobile banking.	Data intense industries operating in countries with high online populations are at greater risk of data breaches and regulatory costs associated with data protection.
	Industry	None	Verizon; Ponemon Institute;	...data intense industries.	Data intense industries operating in countries with high online populations are at greater risk of data breaches and regulatory costs associated with data protection.

SASB Issue	Score Type	Subscores Generated	Raw Data Sources	Reading the Score: High scores indicate...	Understanding the Risk
Access & Affordability	Geographic	None	Chandy and Seidel (2017); World Data Lab; OECD;	...countries with high income inequality or poverty rates.	Industries offering basic needs in countries with high rates of income inequality or poverty face market access risk and brand risk correlating with pricing and business practices.
	Industry	None	SASB;	...industries identified by SASB and ESG practitioners as facing material affordability risks.	Industries offering basic needs in countries with high rates of income inequality or poverty face market access risk and brand risk correlating with pricing and business practices.
Product Quality & Safety	Geographic	Recall subscore; Consumer spending subscore;	OECD; Preqin;	...countries with high discretionary spending per capita in jurisdictions with high recall rates.	Industries where warranty costs are high in countries with high recall rates or consumer spending are more likely to see higher costs in the event of a product failure.
	Industry	None	Kale, Meneghetti, Shahrur (2010);	...industries with high warranty costs as a percentage of sales.	Industries where warranty costs are high in countries with high recall rates or consumer spending are more likely to see higher costs in the event of a product failure.
Customer Welfare	Geographic	Preexisting condition subscore; Safety net subscore;	World Bank; WHO; Gallup;	...countries with a populations of high health risk factors and limited social safety nets.	Industries where consumer safety risk is a byproduct of product usage in countries with existing health risks and limited safety nets are more likely to see higher regulatory costs and market access loss.
	Industry	None	FTC; SASB;	...industries identified by SASB, the FTC, and ESG practitioners as facing material consumer safety risks.	Industries where consumer safety risk is a byproduct of product usage in countries with existing health risks and limited safety nets are more likely to see higher regulatory costs and market access loss.
Selling Practices & Product Labeling	Geographic	None	OECD; United Nations Conference on Trade and Development;	...countries where consumer spending is high and consumer protection legislation is neither pending nor passed.	Industries with unfettered access to high spending consumer cohorts are at a high risk of loss of product market access in the event of widespread fraudulent selling.
	Industry	None	SASB;	...industries identified by SASB and ESG practitioners as facing material misselling risk.	Industries with unfettered access to high spending consumer cohorts are at a high risk of loss of product market access in the event of widespread fraudulent selling.
Labor Practices	Geographic	None	ILO; OECD;	...countries where fundamental labor rights are limited and unemployment is high.	Industries with low unionization and low wages in countries with limited labor rights and high unemployment are at high risk of strike, increased labor costs over time, or regulatory oversight.
	Industry	None	US BLS;	...industries where unionization rates are high and median pay is low.	Industries with low unionization and low wages in countries with limited labor rights and high unemployment are at high risk of strike, increased labor costs over time, or regulatory oversight.

SASB Issue	Score Type	Subscores Generated	Raw Data Sources	Reading the Score: High scores indicate...	Understanding the Risk
Employee Health & Safety	Geographic	None	Alsamawi et al (2017); UN GovData 360;	...countries with limited fundamental labor rights, high work related fatalities, and weak regulatory oversight.	Industries with high injury or fatality rates in countries with weak oversight of labor are at a high risk of strike, increased labor costs, or market access loss.
	Industry	None	US BLS;	...industries with high lost time to injuries or high fatalities.	Industries with high injury or fatality rates in countries with weak oversight of labor are at a high risk of strike, increased labor costs, or market access loss.
Employee Engagement, Diversity & Inclusion	Geographic	Education risk subscore; Gender opportunity subscore; Employee cost subscore;	UNESCO; OECD; The Times; IPU; World Bank;	...countries with highly educated, highly paid workforces with untapped gender-related workforces.	Industries that require highly educated and highly paid talent in countries with accessible talent have a high risk of competitive employee attraction dynamics and increasing employee costs.
	Industry	None	US BLS;	...industries with highly paid, highly educated employees.	Industries that require highly educated and highly paid talent in countries with accessible talent have a high risk of competitive employee attraction dynamics and increasing employee costs.
Product Design & Life-cycle Management	Geographic	None	OCED; World Bank; UNU-IAS;	...countries that generate significant waste with limited or unknown recycling capabilities.	Industries with limited product life-cycle design contingencies in countries with waste management weaknesses face higher regulatory and environmental risks and costs.
	Industry	None	SASB;	...industries identified by SASB and ESG practitioners as facing product life-cycle risk.	Industries with limited product life-cycle design contingencies in countries with waste management weaknesses face higher regulatory and environmental risks and costs.
Business Model Resilience	Geographic	None	National Science Foundation; UNESCO; OECD;	...countries with limited expenditure or experience in science and research.	Industries that underspend on future proofing in countries with limited focus on research, science, and patents are more susceptible to sudden market change or losing out on innovation.
	Industry	None	National Science Foundation;	...industries that, on average, spend less on research and development.	Industries that underspend on future proofing in countries with limited focus on research, science, and patents are more susceptible to sudden market change or losing out on innovation.
Supply Chain Management	Geographic	None	World Bank; Transparency International; OECD; Preqin;	...countries with high exports, corruption issues, and weak labor rights.	Industries with high trade cost operating in countries reliant on exports with weak labor rights are at risk of being disrupted by supply chain issues resulting in delays or operational costs.
	Industry	None	WTO;	...industries with high median tariffs.	Industries with high trade cost operating in countries reliant on exports with weak labor rights are at risk of being disrupted by supply chain issues resulting in delays or operational costs.

SASB Issue	Score Type	Subscores Generated	Raw Data Sources	Reading the Score: High scores indicate...	Understanding the Risk
Materials Sourcing & Efficiency	Geographic	None	World Bank	...countries with low raw material exports.	Industries with high raw material input demand operating in countries with limited exports of raw material run the risk of supply disruption, sourcing issues, and operational cost increases.
	Industry	None	BEA; US Federal Reserve;	...industries with high raw material demands and input costs.	Industries with high raw material input demand operating in countries with limited exports of raw material run the risk of supply disruption, sourcing issues, and operational cost increases.
Physical Impacts of Climate Change	Geographic	None	IMF; Climate Central; NASA; Sedac;	...countries with high climate-related disasters, sea level rise projections, or urban populations in coastal regions with limited insurance penetration.	Industries that are physical asset heavy in countries where climate disasters are increasingly prevalent with no financial backstop run the risk of stranding assets, increased insurance costs, and relocation costs.
	Industry	None	SASB;	...industries identified by SASB and ESG practitioners as facing physical climate change risk.	Industries that are physical asset heavy in countries where climate disasters are increasingly prevalent with no financial backstop run the risk of stranding assets, increased insurance costs, and relocation costs.
Business Ethics	Geographic	None	Transparency Internation; World Bank; Tax Justice Network;	...countries that are tax havens or have weak business disclosure and high perceived corruption.	Industries which are repeat offenders of the US Foreign Corrupt Practices Act operating in tax havens or countries with high perceived corruption are at high risk of being targeted or scrutinized by regulators for corruption.
	Industry	None	Stanford FCPA Tracker;	...industries with high cumulative settlements under the Foreign Corrupt Practices Act.	Industries which are repeat offenders of the US Foreign Corrupt Practices Act operating in tax havens or countries with high perceived corruption are at high risk of being targeted or scrutinized by regulators for corruption.
Competitive Behavior	Geographic	None	OECD; World Bank GovData 360;	...countries with weak regulatory quality with a high prevalence of business cartels.	Industries that are highly concentrated in countries with weak regulators and known cartels are at risk of facing regulatory costs related to anticompetitive behavior.
	Industry	None	OECD; US Census;	...industries with high levels of anticompetitive sanctions and high industry concentrations.	Industries that are highly concentrated in countries with weak regulators and known cartels are at risk of facing regulatory costs related to anticompetitive behavior.
Management of the Legal & Regulatory Environment	Geographic	None	World Bank GovData 360;	...countries with weak rule of law and regulatory quality.	Industries that are a focus of regulation in countries with weak regulator quality and rule of law face the risk of sudden or highly variable enforcement costs.
	Industry	None	George Mason University;	...industries with higher levels of regulatory restrictions.	Industries that are a focus of regulation in countries with weak regulator quality and rule of law face the risk of sudden or highly variable enforcement costs.

SASB Issue	Score Type	Subscores Generated	Raw Data Sources	Reading the Score: High scores indicate...	Understanding the Risk
Critical Incident Risk Management	Geographic	None	World Bank GovData 360;	...countries with low insurance penetration.	Industries where critical failures are more probable in countries with low insurance penetration face a higher probability of fat tail event-driven cost.
	Industry	None	SASB;	...industries identified by SASB and ESG practitioners as facing critical incident risk.	Industries where critical failures are more probable in countries with low insurance penetration face a higher probability of fat tail event-driven cost.
Systemic Risk Management	Geographic	None	World Bank GovData 360;	...countries with weak system strength, either financial or ecological, and weak institutional oversight.	Industries where systemic risk is prevalent in countries with weak system and institutional strength face a higher probability either driving or absorbing fat tail costs related to system failures.
	Industry	None	SASB;	...industries identified by SASB and ESG practitioners as facing systemic risk.	Industries where systemic risk is prevalent in countries with weak system and institutional strength face a higher probability either driving or absorbing fat tail costs related to system failures.

Appendix G: ESG Geography Risk Score Data Sources

SASB Factor	Indicator	Source
GHG Emissions	CO ₂ emissions from fossil fuel combustion and cement production (tCO ₂ /capita)	Global Carbon Project
GHG Emissions	CO ₂ emissions embodied in fossil fuel exports (kg/capita)	UN Comtrade
GHG Emissions	Fossil fuel support (OECD, \$USDm)	OECD
GHG Emissions	Carbon Pricing Score at EUR60/tCO ₂ (% , worst 0100 best)	OECD
GHG Emissions	Implied average (of conditional & unconditional) economy-wide reduction in 2030 CO ₂ emissions as a percentage of the Business as Usual estimate for 2030	IMF
Air Quality	Annual mean concentration of particulate matter of less than 2.5 microns in diameter (PM _{2.5}) (µg/m ³)	IHME
Air Quality	Agestandardized death rate attributable to household air pollution and ambient air pollution (per 100,000 population)	WHO
Energy Management	Share of renewable energy in total primary energy supply (%)	OECD
Water & Wastewater Management	Population using at least basic drinking water services (%)	JMP
Water & Wastewater Management	Population using at least basic sanitation services (%)	JMP
Water & Wastewater Management	Anthropogenic wastewater that receives treatment (%)	EPI
Water & Wastewater Management	Population using safely managed water services (%)	JMP
Water & Wastewater Management	Population using safely managed sanitation services (%)	JMP
Water & Wastewater Management	Freshwater withdrawal (% of available freshwater resources)	FAO
Water & Wastewater Management	Scarce water consumption embodied in imports (m ³ /capita)	Lenzen et al. (2013)
Waste & Hazardous Materials Management	Exports of hazardous pesticides (tonnes per million population)	FAO
Waste & Hazardous Materials Management	Productionbased SO ₂ emissions (kg/capita)	Lenzen et al. (2020)
Waste & Hazardous Materials Management	SO ₂ emissions embodied in imports (kg/capita)	Lenzen et al. (2020)
Waste & Hazardous Materials Management	Productionbased nitrogen emissions (kg/capita)	Oita et al. (2016)
Waste & Hazardous Materials Management	Nitrogen emissions embodied in imports (kg/capita)	Oita et al. (2016)
Ecological Impacts	Mean area that is protected in marine sites important to biodiversity (%)	Birdlife International et al.
Ecological Impacts	Mean area that is protected in terrestrial sites important to biodiversity (%)	Birdlife International et al.
Ecological Impacts	Mean area that is protected in freshwater sites important to biodiversity (%)	Birdlife International et al.
Ecological Impacts	Marine biodiversity threats embodied in imports (per million population)	Lenzen et al. (2012)
Ecological Impacts	Terrestrial and freshwater biodiversity threats embodied in imports (per million population)	Lenzen et al. (2012)
Ecological Impacts	Red List Index of species survival (worst 01 best)	IUCN and Birdlife International
Ecological Impacts	Ocean Health Index: Clean Waters score (worst 0100 best)	Ocean Health Index
Ecological Impacts	Permanent deforestation (% of forest area, 5year average)	Curtis et al. (2018)

SASB Factor	Indicator	Source
Ecological Impacts	ECS Ecosystem services (tree, grass, wetland loss)	EPI
Human Rights & Community Relations	Prevalence of undernourishment (%)	FAO
Human Rights & Community Relations	Adolescent fertility rate (births per 1,000 females aged 15 to 19)	UNDESA
Human Rights & Community Relations	Poverty headcount ratio at \$3.20/day (%)	World Data Lab
Human Rights & Community Relations	Population with rent overburden (%)	OECD
Human Rights & Community Relations	Fundamental labor rights are effectively guaranteed (worst 0–1 best)	World Justice Project
Human Rights & Community Relations	Universal health coverage (UHC) index of service coverage (worst 0100 best)	WHO
Human Rights & Community Relations	Children involved in child labor (% of population aged 5 to 14)	UNICEF
Human Rights & Community Relations	Victims of modern slavery (per 1,000 population)	Walk Free Foundation (2018)
Customer Privacy	Data privacy legislation	United Nations Conference on Trade and Development
Customer Privacy	Data privacy draft legislation	United Nations Conference on Trade and Development
Data Security	Population using the internet (%)	ITU
Data Security	Mobile broadband subscriptions (per 100 population)	ITU
Data Security	Adults with an account at a bank or other financial institution or with a mobile	World Bank
Access & Affordability	Gini coefficient adjusted for top income	Chandy and Seidel (2017)
Access & Affordability	Poverty headcount ratio at \$1.90/day (%)	World Data Lab
Access & Affordability	Poverty rate after taxes and transfers (%)	OECD
Product Quality & Safety	Jurisdiction of Recall	OECD
Product Quality & Safety	Recalls per USDbn household spending	Preqin
Product Quality & Safety	Household spending per capita	OECD
Customer Welfare	Prevalence of current tobacco use (% of adults)	World Bank
Customer Welfare	Total per capital (15+) consumption (in litres of pure alcohol) by country	WHO
Customer Welfare	Prevalence of obesity, BMI ≥ 30 (% of adult population)	WHO
Customer Welfare	Subjective well-being (average ladder score, worst 010 best)	Gallup
Selling Practices & Product Labeling	Household spending per capita	OECD
Selling Practices & Product Labeling	Consumer protection legislation	United Nations Conference on Trade and Development
Selling Practices & Product Labeling	Consumer protection draft legislation	United Nations Conference on Trade and Development
Labor Practices	Unemployment rate (% of total labor force)	ILO
Labor Practices	Employment-to-population ratio (%)	OECD
Employee Health & Safety	Fatal work-related accidents embodied in imports (per 100,000 population)	Alsamawi et al. (2017)
Employee Health & Safety	Regulatory Quality	GovData 360
Employee Engagement, Diversity & Inclusion	Net primary enrollment rate (%)	UNESCO
Employee Engagement, Diversity & Inclusion	Lower secondary completion rate (%)	UNESCO
Employee Engagement, Diversity & Inclusion	Literacy rate (% of population aged 15 to 24)	UNESCO

SASB Factor	Indicator	Source
Employee Engagement, Diversity & Inclusion	Tertiary educational attainment (% of population aged 25 to 34)	OECD
Employee Engagement, Diversity & Inclusion	The Times Higher Education Universities Ranking: Average score of top 3 universities	#N/A
Employee Engagement, Diversity & Inclusion	Ratio of female-to-male mean years of education received (%)	UNESCO
Employee Engagement, Diversity & Inclusion	Seats held by women in national parliament (%)	IPU
Employee Engagement, Diversity & Inclusion	Female share of graduates from STEM fields at the tertiary level (%)	World Bank
Employee Engagement, Diversity & Inclusion	Ratio of female-to-male labor force participation rate (%)	ILO
Employee Engagement, Diversity & Inclusion	Gender wage gap (% of male median wage)	OECD
Employee Engagement, Diversity & Inclusion	Gender gap in time spent doing unpaid work (minutes/day)	OECD
Employee Engagement, Diversity & Inclusion	Adjusted net national income per capita (current US\$)	World Bank
Employee Engagement, Diversity & Inclusion	Social spending, % of GDP	OECD
Employee Engagement, Diversity & Inclusion	Employment by job tenure intervals average tenure	OECD
Product Design & Life-cycle Management	Non-recycled municipal solid waste (kg/capita/day)	OECD
Product Design & Life-cycle Management	Municipal solid waste (kg/capita/day)	World Bank
Product Design & Life-cycle Management	Electronic waste (kg/capita)	UNUIAS
Business Model Resilience	Scientific and technical journal articles (per 1,000 population)	National Science Foundation
Business Model Resilience	Expenditure on research and development (% of GDP)	UNESCO
Business Model Resilience	Researchers (per 1,000 employed population)	OECD
Business Model Resilience	Triadic patent families filed (per million population)	OECD
Supply Chain Management	Logistics Performance Index: Quality of trade and transport-related infrastructure (worst 15 best)	World Bank
Supply Chain Management	Corruption Perception Index (worst 0100 best)	Transparency International
Supply Chain Management	Economy where made	OECD
Supply Chain Management	Exports (USD) to Imports (USD) ratio (high = more exports)	Preqin
Materials Sourcing & Efficiency	Raw materials Exports by country in US\$ Thousand	World Bank
Physical Impacts of Climate Change	S&P Physical Climate Change Risk Scenarios	S&P Global
Business Ethics	Business extent of disclosure index (0=less disclosure to 10=more disclosure)	World Bank
Business Ethics	Corporate Tax Haven Score (best 0100 worst)	Tax Justice Network
Competitive Behavior	Regulatory quality	GovData 360
Management of the Legal & Regulatory Environment	Rule of Law	GovData 360
Critical Incident Risk Management	GCI 4.0: Insurance premium	GovData 360
Critical Incident Risk Management	GCI 4.0: Non-life insurance premiums	GovData 360
Systemic Risk Management	Financial system strength	GovData 360
Systemic Risk Management	Quality of infrastructure	GovData 360

Appendix H: Risk Exposure Estimate Step by Step

We will use a case study to explain the process to build the ESG Risk Exposure Estimate.

For the case study consider:

- A Food Manufacturer based in the United Kingdom
- A Home Repair company based in China.

Industry Model

Step 1: Identify the industry

Prior to any analysis, we've mapped all Preqin industries (excepting the Preqin verticals which represent hybrid and highly specific industries and business lines) to the North American Industry Classification System (NAICS) across 2-, 3-, 4-, 5-, and 6-digit industry codes where applicable. Similarly, for all third party data used (for example, the Bureau of Labor Statistics) to relevant NAICS codes as well in order to have a common industry crosswalk and accurately map like-to-like.

Step 2: Identify the material ESG issues facing this industry

Our starting point for determining materiality of an issue in a given industry is the Sustainable Accounting Standards Board (SASB) Materiality framework⁹. SASB does not offer an assessment of risk, but they crowdsourced material issues over a decade from the financial markets and offer a binary system of identification. For instance, using our case study companies, Employee Health & Safety has been identified by SASB as a material issue for Food Manufacturers and was NOT identified as material issue for Home Repair. Each issue identified by SASB as material will receive a score whether or not is considered material for any particular industry.

Step 2a: Where SASB identifies a material ESG issue...

Where SASB identifies a material ESG issue, a "floor" score of 7 out of 10. In our case study, the Food Manufacturer is assigned a 7 out of 10 as a starting point for Employee Health & Safety risk per SASB's identification of material issues.

Step 2b: Where SASB does NOT identify a material ESG issue...

Where SASB does NOT identify a particular issue as material, a "floor" score of 2 out of 10. In our case study, the Home Repair company did NOT have Employee Health & Safety identified as a key material risk by SASB's framework and was assigned a 2 out of 10 as a starting point.

Step 3a: Leverage alternative data to enhance scores where available...

At this point, we have a "floor" score based entirely on mapping the industry of a portfolio company to SASB material ESG issues by industry. In order to generate a more complete view of industry risk, we turned to alternative data sources.

Known limitation: Preqin is curating and interpreting the alternative data sets against the SASB framework of material risk. There are cases where the available market data does not perfectly fit the SASB definition of material or is, at best, a proxy. There are cases where there is no market data that informs the issue available, or the data that's available isn't scalable or maintained. There are cases where Preqin may curate data points in a manner that doesn't fully reflect the issue at hand. These are known limitations.

Our case study uses a company where Employee Health & Safety is considered material and one where it is not. We collected data from the Bureau of Labor Statistics (BLS) that outlines injury and fatality rates by industry to use as a broad proxy for how dangerous a particular industry can be. The data comes in raw form - we used three KPIs:

- Fatalities per 1,000 employees;
- Industry fatalities as a percentage of all industry fatalities;
- Incidence rate of nonfatal occupational injuries by industry.

⁹ <https://www.sasb.org/standards/materiality-map/>

Each KPI was transformed using one of a series of semi-standard transforms designed to cap bottom and top outliers. Typical normalizations used for scoring the data sets include:

- Min/Max constrained or unconstrained transformations
 - Minimum floor, maximum ceiling
 - 5th percentile floor, 95th percentile ceiling
 - 10th percentile floor, 90th percentile ceiling
- Log transforms
- Binary thresholds: Greater than threshold is a 10, lower is a 0
- Quartile scoring

In this case we used the following:

Min/Max Transform standardized between 0 and 5:

$$\frac{(\text{raw data point} - 10\text{th percentile of all data}) \div (\text{90th percentile of all data} - 10\text{th percentile of all data}) \times 5}$$

Constrained between 0 and 5

Each data set was force ranked in this manner and the results were averaged together. However, there are cases in which there are no alternative data sets that fit the assessment, in which case we alter the “floor” score to reflect it.

Step 3b: Adjust the SASB “floor” where data is unavailable

For certain issues (listed here), there are no available, scalable, or broad enough data sets that are useful to inform the materiality of an issue on an industry by industry basis. In these cases, the SASB floor is simply adjusted to a 10 out of 10 in cases where SASB’s framework assumes it to be material, and retains the score of 2 out of 10 in cases where it is not deemed to be material. In those cases, this would represent the final industry score.

Step 4: Combine KPI assessments

Certain issues may use a variety of averaging, maximum, minimum, or weighting techniques to generate subscores and final scores based on the transformed raw data scores. In this case, industries with high fatality rates and high injury rates had a higher “adjustment factor” based on alternative proxy data to indicate higher risk.

In the case study, we have the following:

Food manufacturing: Employee Health & Safety	BLS fatalities per 1,000	BLS fatalities as % of all industries	BLS injury incidence rate
Raw KPI Score	1.6	2.1	3.5
Subscore	2.8		
SASB Floor	+7.0		
Final Industry ESG Risk Score (constrained)	= 9.8		

Home repair services: Employee Health & Safety	BLS fatalities per 1,000	BLS fatalities as % of all industries	BLS injury incidence rate
Raw KPI Score	5.5	5.0	3.8
Subscore	4.6		
SASB Floor	+2.0		
Final Industry ESG Risk Score (constrained)	= 6.6		

The alternative data sets effectively supplement the SASB framework’s crowdsourced assessment of material risk by suggesting that, while Food Manufacturing companies clearly face Employee Health & Safety risks, Home Repair Services actually have among the highest risks of injury according to BLS data, and overall the risk is not entirely immaterial.

This process is then repeated across each of the 26 SASB material issues for each industry, the output of which is a broad array of issue scores.

Key statistics are listed below:

- 7 SASB issues used a binary 2-10 score due to lack of data
- 19 SASB issues used alternative data sets to enhance the SASB floor
 - 38 data sets were leveraged in these cases
 - 28 separate sources were used (24 NGO, quasi-government, or government, 4 academic)
 - 26 data sets are routinely refreshed
 - Reference years for the data ranged from 2002-2022

Step 5: Score roll ups

Upon completion of scoring each SASB issue, scores are rolled up into pillar scores in two ways. First, using SASB pillars - Environment, Social Capital, Human Capital, Business Model & Innovation, Leadership & Governance. Each pillar is a simple average of relevant issues, rescaled between 0-10 using a maximum/minimum transform between 0 and 10 in order to highlight differences between industries.

The second score roll up is at the Environmental, Social, and Governance pillar level. In this case, SASB's Environment pillar is equivalent of the Environmental pillar, the Social pillar averages each score under the Social Capital, Human Capital, and Business Model & Innovation SASB pillars, and the Governance pillar is the equivalent of the Leadership & Governance SASB pillar.

The overall ESG score is a simple average of the Environment, Social, and Governance pillar scores with a maximum/minimum transform between 0 and 10.

Geography Model**Step 1: Identify the country**

Prior to executing any primary research, we mapped Preqin geographic taxonomies three-letter ISO3 codes – a unified taxonomy, promoted by International Organization for Standardization (ISO).

Step 2: Leverage alternative data

We first identified a variety of public sources of country-level data. The selected sources included NGOs, academic research, market regulators,

international bodies, and the offices of national statistics. This data was utilized to create a single score for each SASB factor in the same manner as the Industry ESG Risk assessment, encapsulating risk exposure across all the countries and dependencies. To assure that our geographic model is conformable, we used the same factors as in the industry risk model. Since no third party provides SASB risk factors country level, these scores were calculated internally by the ESG team.

Our case study considers a Food Manufacturer in the UK and a Home Repair company in China. We collected data from the World Bank's GovData 360 platform, as well as from an academic paper by Alsamawi et al. (2017) and the World Justice Project that outlined whether labor rights are prevalent, rates of fatalities related to work, and regulator strength. The data comes in a mix of raw and score form - we used three KPIs:

- Fundamental labor rights are effectively guaranteed score (worst 0 - 1 best);
- Fatal work-related accidents embodied in imports (per 100,000 population);
- Regulatory quality score.

Each KPI was transformed using one of a series of semi-standard transforms designed to cap bottom and top outlier.

In this case we used the following:

$$\frac{\text{Min/Max Transform standardized between 0 and 10:}}{\text{(raw data point - 10th percentile of all data) ÷}} \\ \text{(90th percentile of all data - 10th percentile of all}} \\ \text{data) x 5}} \\ \text{Constrained between 0 and 5}$$

The Regulatory Quality input was inverted such that a 10 were values below the 10th percentile and a 0 was assigned to values above the 90th percentile.

Step 3: Combine KPI assessments

Certain issues may use a variety of averaging, maximum, minimum, or weighting techniques to generate subscores and final scores based on the transformed raw data scores. In this case study using Employee Health & Safety in either the UK or China, the subscore was generated using the maximum of one KPI and the average of two others.

In the case study, we have the following:

UK: Employee Health & Safety	Fundamental labor rights are effectively guaranteed	Fatal work- related accidents embodied in imports	Regulatory quality score
Raw KPI Score	3.6	10.0	0.0
Subscore	5.0		
Final Geographic ESG Risk Score (constrained)	= 2.8		

China: Employee Health & Safety	Fundamental labor rights are effectively guaranteed	Fatal work- related accidents embodied in imports	Regulatory quality score
Raw KPI Score	10.0	0.4	5.7
Subscore	5.0		
Final Geographic ESG Risk Score (constrained)	= 10.0		

China represents nearly four times the Employee Health & Safety risk according to the raw data inputs Preqin selected.

This process is then repeated across each of the 26 SASB material issues for each geography, the output of which is a broad array of issue scores.

Key statistics are listed below:

- 141 data sets were leveraged in these cases from 58 separate sources.
- Reference years for the data ranged from 1980-2022

Final Step: ESG Risk Exposure Estimate

After we obtained 289 Industry ESG Risk Scores and 221 Geography ESG Risk Scores, the last step was to combine the two and generate a total ESG Risk Exposure Estimate. Industry ESG risk serves as a baseline score which is adjusted up to ±50% to account for Geographic factors based on the firm’s headquarters location. We calculate it using the formulas

$$\text{Risk Exposure Estimate} = f(\text{Industry Risk Score} \times [1 + \text{Geography Risk Modifier}])$$

$$\text{Geography Risk Modifier} = \frac{(\text{Geography Risk Score} - 5.0)}{10.0}$$

Function $f(x) = \max(0.0, \min(x, 10.0))$ above guarantees that the outcome is bound between numeric 0.0 and 10.0. The result of this calculation is the ESG Risk Exposure Estimate.

This modifier typically has a moderate effect on scores. For 70% of all the combinations of a country and an industry the difference between the baseline Industry ESG Risk Score and the final ESG Risk Exposure Score lies in between -1 and +1. This framework allows us to obtain a proxy of ESG risk exposure for every firm in each portfolio. In result, we can aggregate risk exposure scores associated with individual deals to fund level and asset manager firm level.

In our case study, the effect of the Geographic modifier and the alternative data becomes immediately apparent - despite SASB finding Employee Health & Safety is not a material risk for a Home Repair company, the alternative data suggested otherwise and the regulatory and stakeholder context in China pushed the risk assessment into the highest echelons at an overall level.

Food Manufacturer (UK): Employee Health & Safety	Industry ESG Risk Score	Geographic ESG Risk Score	BLS injury incidence rate
ESG Risk Scores	9.8	2.8	-2.2
Overall ESG Risk Exposure Estimate Score (constrained)		= 7.6	

Home Repair (Chi-na): Employee Health & Safety	Industry ESG Risk Score	Geographic ESG Risk Score	Geographic ESG Risk Modifier
ESG Risk Scores	6.6	10.0	+3.3
Overall ESG Risk Exposure Estimate Score (constrained)		= 9.9	

Appendix I: Impact Industry Taxonomy

Preqin Industry Taxonomy

Level 1	Level 2	Level 3	Impact Industries Final
Raw Materials & Natural Resources	Agribusiness	Crop Production	Crop Production
Raw Materials & Natural Resources	Agribusiness	Dairy Farming	Dairy Farming
Raw Materials & Natural Resources	Agribusiness	Farm Equipment	Farm Equipment
Raw Materials & Natural Resources	Agribusiness	Farm Support Services	Farm Support Services
Raw Materials & Natural Resources	Agribusiness	Fishing & Seafood	Fishing & Seafood
Raw Materials & Natural Resources	Agribusiness	Other Animal Husbandry	Other Animal Husbandry
Raw Materials & Natural Resources	Agribusiness	-	Agribusiness
Healthcare	Biopolymers	-	Biopolymers
Healthcare	Biotechnology	Bioinformatics	Bioinformatics
Healthcare	Biotechnology	BioPharmaceuticals	BioPharmaceuticals
Healthcare	Biotechnology	Molecular Science, Genetics & Gene Therapy	Molecular Science, Genetics & Gene Therapy
Healthcare	Biotechnology	-	Biotechnology
Consumer Discretionary	Consumer Services	Childcare Services	Childcare Services
Consumer Discretionary	Consumer Services	Retail Law	Retail Law
Consumer Discretionary	Education/Training	Colleges & Universities	Colleges & Universities
Consumer Discretionary	Education/Training	Education & Training Services	Education & Training Services
Consumer Discretionary	Education/Training	Education & Training Website	Education & Training Website
Consumer Discretionary	Education/Training	Schools	Schools
Consumer Discretionary	Education/Training	-	Education/Training
Information Technology	Electronics	Solid State Lighting (SSL)	Solid State Lighting (SSL)
Industrials	Energy Storage & Batteries	-	Energy Storage & Batteries
Industrials	Environmental Services	Green IT	Green IT
Industrials	Environmental Services	Pollution Control	Pollution Control
Industrials	Environmental Services	Recycling	Recycling
Industrials	Environmental Services	-	Environmental Services
Consumer Discretionary	Food	Canned/Frozen Fruit & Vegetables	Canned/Frozen Fruit & Vegetables
Consumer Discretionary	Food	Dairy Products	Dairy Products
Consumer Discretionary	Food	Health Foods & Nutritional Supplements	Health Foods & Nutritional Supplements
Consumer Discretionary	Food	Meat, Poultry & Seafood Products	Meat, Poultry & Seafood Products
Consumer Discretionary	Food	Other Food Products	Other Food Products
Healthcare	Healthcare	Alternative Medicine	Alternative Medicine
Healthcare	Healthcare	Clinics/Outpatient Services	Clinics/Outpatient Services
Healthcare	Healthcare	Diagnostic, Medical & Imaging Laboratories	Diagnostic, Medical & Imaging Laboratories

Preqin Industry Taxonomy

Level 1	Level 2	Level 3	Impact Industries Final
Healthcare	Healthcare	Emergency Services	Emergency Services
Healthcare	Healthcare	Epidemiology	Epidemiology
Healthcare	Healthcare	Home Healthcare, Nursing Homes & Assisted Living	Home Healthcare, Nursing Homes & Assisted Living
Healthcare	Healthcare	Hospitals	Hospitals
Healthcare	Healthcare	-	Healthcare
Healthcare	Healthcare IT	-	Healthcare IT
Healthcare	Healthcare Specialists	Cardiology	Cardiology
Healthcare	Healthcare Specialists	Chiropractic, Orthopedic & Phys-ical Therapy	Chiropractic, Orthopedic & Phys-ical Therapy
Healthcare	Healthcare Specialists	Dental Products & Services	Dental Products & Services
Healthcare	Healthcare Specialists	Dermatology	Dermatology
Healthcare	Healthcare Specialists	Mental Health Services	Mental Health Services
Healthcare	Healthcare Specialists	Oncology/Cancer Treatment	Oncology/Cancer Treatment
Healthcare	Healthcare Specialists	Optometrists & Opticians Products & services	Optometrists & Opticians Products & services
Healthcare	Healthcare Specialists	-	Healthcare Specialists
Financial & Insurance Services	Insurance	Health Insurance	Health Insurance
Information Technology	IT Infrastructure	-	IT Infrastructure
Information Technology	IT Security/Cybersecurity	-	IT Security/Cybersecurity
Raw Materials & Natural Resources	Materials	Biomaterials	Biomaterials
Raw Materials & Natural Resources	Materials	Biopolymer Materials	Biopolymer Materials
Raw Materials & Natural Resources	Materials	Environmental Materials	Environmental Materials
Healthcare	Medical Devices & Equipment	Diagnostic Equipment	Diagnostic Equipment
Healthcare	Medical Devices & Equipment	Medical Supplies	Medical Supplies
Healthcare	Medical Devices & Equipment	Monitoring Equipment	Monitoring Equipment
Healthcare	Medical Devices & Equipment	Surgical Devices	Surgical Devices
Healthcare	Medical Devices & Equipment	Therapeutic Devices	Therapeutic Devices
Healthcare	Pharmaceuticals	Pharmaceutical Research & Development	Pharmaceutical Research & Development
Healthcare	Pharmaceuticals	Specialty Pharmaceuticals	Specialty Pharmaceuticals
Energy & Utilities	Power & Utilities	Waste Management	Waste Management
Energy & Utilities	Power & Utilities	Waste to Energy	Waste to Energy
Energy & Utilities	Power & Utilities	Water and Sewer Utilities	Water and Sewer Utilities
Energy & Utilities	Renewable Energy	Biomass	Biomass
Energy & Utilities	Renewable Energy	GeoThermal	GeoThermal
Energy & Utilities	Renewable Energy	Hydro Power	Hydro Power
Energy & Utilities	Renewable Energy	Solar Power	Solar Power
Energy & Utilities	Renewable Energy	Wind Power	Wind Power
Energy & Utilities	Renewable Energy	-	Renewable Energy
Information Technology	Software	Education & Training Software	Education & Training Software
FinTech	eWallets & Money Transfer	-	eWallets & Money Transfer

Preqin Industry Taxonomy

Level 1	Level 2	Level 3	Impact Industries Final
IoT (Internet of Things)	Smart Agriculture/Farming	-	Smart Agriculture/Farming
IoT (Internet of Things)	Smart City	-	Smart City
IoT (Internet of Things)	Smart Grid	-	Smart Grid
Agtech	-	-	Agtech
Clean Technology	-	-	Clean Technology
EdTech	-	-	EdTech
Electric & Hybrid Vehicles	-	-	Electric & Hybrid Vehicles
HealthTech	-	-	HealthTech
Urban Planning	-	-	Urban Planning

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