SUSTAINALYTICS
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METHODOLOGY

THE CARBON RISK RATINGS

METHODOLOGY

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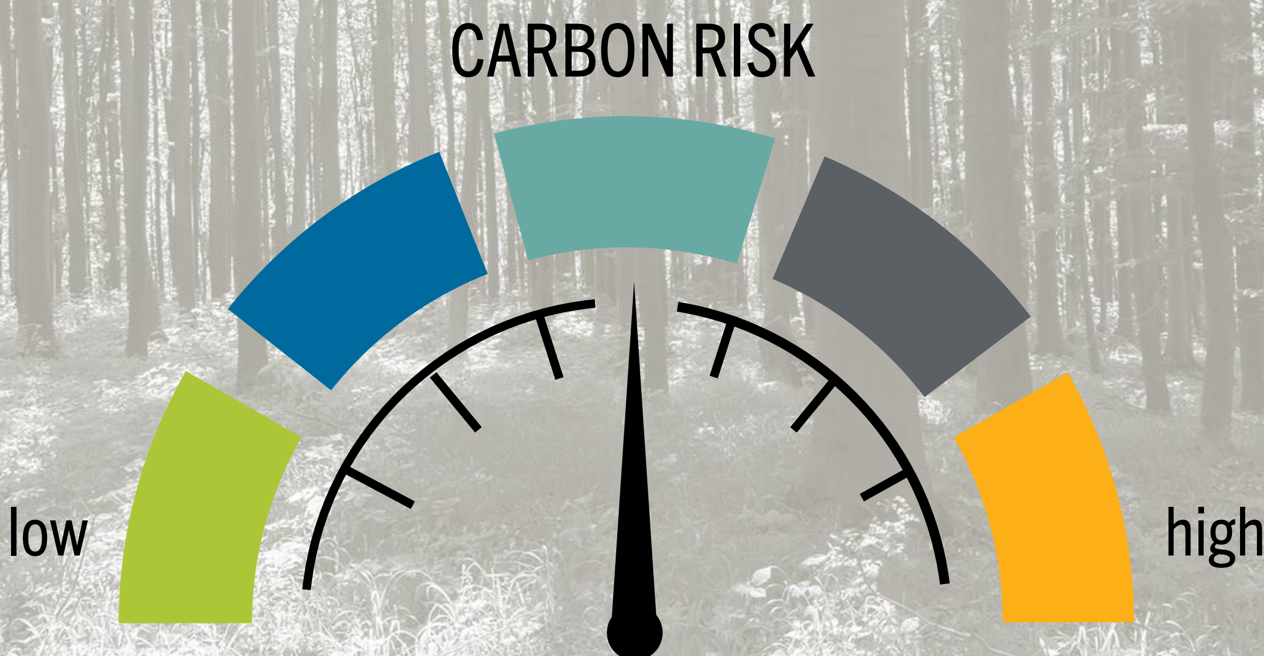

About Sustainalytics, A Morningstar Company

Sustainalytics, a Morningstar Company, is a leading ESG research, ratings and data firm that supports investors around the world with the development and implementation of responsible investment strategies. For more than 25 years, the firm has been at the forefront of developing high-quality, innovative solutions to meet the evolving needs of global investors. Today, Sustainalytics works with hundreds of the world's leading asset managers and pension funds who incorporate ESG and corporate governance information and assessments into their investment processes. Sustainalytics also works with hundreds of companies and their financial intermediaries to help them consider sustainability in policies, practices and capital projects. With 17 offices globally, Sustainalytics has more than 800 staff members, including more than 300 analysts with varied multidisciplinary expertise across more than 40 industry groups. For more information, visit www.sustainalytics.com.

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Introduction

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This document is an overview of the methodological aspects of Sustainalytics' **Carbon Risk Ratings**[2]. It is focused on issues that are specific to carbon and from that standpoint, can be considered a **Thematic Risk Rating** as opposed to the ESG Risk Ratings which cover all aspects of ESG.

The Carbon Risk Ratings were launched in May 2018 and updated in April 2021. The updated methodology reflects the separation of Carbon – Finance assessments from the assessments for Carbon – Products & Services. Additionally, this document provides details on the scoring aggregation to recognize the Carbon Risk Ratings as a separate, stand-alone product from the ESG Risk Ratings.

A Global Perspective on Carbon Risk

Carbon risks can pose significant investment risks

Climate change has the potential to disrupt future business prospects, particularly for carbon-intensive industries and those that sell carbon intensive products. This risk is amplified by the introduction of legislation and carbon pricing, based on scientific targets to mitigate human-induced climate change. These potential disruptions can pose significant investment risks.

Measurement of Carbon Risk

The Carbon Risk Ratings support informed investment decisions about the risks posed by a carbon transition

The Carbon Risk Ratings measure the degree to which a company's enterprise value is at risk driven by factors related to society's transition to a low carbon economy. Technically speaking, the ratings assess the magnitude of a company's unmanaged carbon risks. The ratings are focused on material risk, supported by two dimensions: **Exposure** and **Management**.

Carbon risk is captured within three material carbon issues

For each company, unmanaged carbon risk is measured by evaluating a company's exposure to and management to three **Material Carbon Issues**, which are a subset of the set of **Material ESG Issues** assessed within Sustainalytics' **ESG Risk Ratings**. The resulting unmanaged risk for each issue is then summed to provide a single score that represents the company's overall carbon risk.

Creating a single currency of carbon risk

A company's Carbon Risk Rating is comprised of a quantitative score and a **Carbon Risk Category**. The quantitative score represents units of unmanaged carbon risk with lower scores representing less unmanaged risk. Based on quantitative scores, companies are grouped into one of five risk categories (negligible, low, medium, high, severe). These risk categories are absolute, meaning that a 'high risk' assessment reflects a comparable degree of unmanaged carbon risk across all subindustries covered. This means that a

[1] Acknowledgements: The authors would like to thank the following people for their comments on earlier drafts of this report: Vikram Puppala, Emma Gordon and Alex Osborne-Saponja.
[2] Text that is highlighted in bold teal indicates a term that is explained in the Glossary of terms in the Appendix.

bank, for example, can be directly compared with an oil company or any other type of company. One point of carbon risk is one point of carbon risk (equivalence principle), no matter which company or which issue it applies to, and points of carbon risk add up across issues to create overall scores.

Defining Materiality and Risk

Influence on the decisions made by a reasonable investor

An issue is considered material within the Carbon Risk Ratings if its presence or absence in financial reporting is likely to influence the decisions made by a reasonable investor. To be considered relevant in the Carbon Risk Ratings, an issue must potentially have a significant impact on the economic value of a company and, hence, its financial risk- and return profile from an investment perspective. It is important to distinguish the Carbon Risk Ratings' use of materiality as a concept from narrower legal or accounting-focused definitions. Not every issue that is considered material in the rating is legally required to be disclosed in company reporting.[1]

Underlying premise is the transitioning to a low carbon economy

Note that an underlying premise of the Carbon Risk Ratings is that the world is transitioning to a low carbon economy and that the effective management of carbon transition risk will support long-term enterprise value, ceteris paribus. Some issues are considered material from this perspective, even if the financial consequences are not fully measurable today.[3]

Materiality risk vs footprint risk

The Carbon Risk Ratings should not be confused with a carbon footprint analysis. Sustainalytics continues to track carbon emissions and calculate carbon intensity for thousands of companies. Emissions data remains useful and helps to inform views on carbon risk. However, the Carbon Risk Ratings goes beyond a single focus on emissions to also consider policies, programmes, involvement in controversies and relative exposure to give a forward-looking perspective. The difference in perspective means that a company's carbon footprint does not necessarily match its carbon risk. For example, there are cases where a company can have a significant carbon footprint, but it is able to manage most of its exposure by being a leader in transitioning to less carbon intensive activities.

Key Features of the Methodology

Focus on materiality and comparability

The Carbon Risk Ratings methodology comprises the following key features:

- **Financial materiality:** Assessment focuses on carbon issues that present the most material risks to the economic value of a company.
- **Two-dimensional lens:** Exposure lens informs investors about what carbon risks a company is facing and the management lens assesses how well the company is managing those risks.
- **Multiple exposure factors**: The exposure dimension reflects factors such as a company's business model, financial strength and event history.

[3] Note: Since carbon risks materialize at an unknown time in the future and depend on a variety of unpredictable conditions, no predictions on financial or share price impacts, or on the time horizon of such impacts, are intended or implied by the Carbon Risk Ratings' outcomes.

- **Comparability**: The 'single-currency-of-risk' approach allows comparability of companies across industries at both the overall and issue-specific risk levels.
- **Responsive to events**: Discounting effect on management scores increases with event severity, giving controversies a higher impact on the rating and making it more dynamic.
- **Forward-looking**: The Carbon Risk Ratings are determined by the underlying notion and concept of exposure that is forward-looking by its very nature; quantitative and qualitative factors that go into the exposure assessment are designed to capture trends and anticipate future developments.

Annual Review of Subindustry Assessments and Model Components

Research is aligned with changing fundamentals and perceptions, adapting to best practices around emerging ESG risks

While the rating model is designed for continuity, the paradigms regarding carbon are dynamic and changes over time due to changes in regulation, societal perception and preferences, as well as new scientific insights and technologies. These shifting perspectives are accounted for via an annual model review of the subindustry level assessments of the Carbon Risk Ratings model and the definition and design of model components.

The annual model review includes the selection and scoring of material carbon issues at the subindustry level, the selection and weighting of indicators that are linked to these issues and the degree to which the identified risks can potentially be managed by companies (refer to manageable risk factors on page 12). Assessment changes and research of new data points are rolled-out on a company-by-company basis in combination with the regular annual profile update.

Material Carbon Issues

The Carbon Risk Ratings are comprised of assessments for three material carbon issues

In the Carbon Risk Ratings, a company's management of and exposure to carbon is broken out into three separate Material Carbon Issues. These issues are focused on a topic, or set of related topics, that require a common set of management initiatives or a similar type of oversight. The Material Carbon Issues are: Carbon – Own Operations, Carbon – Products and Services, and Carbon Finance. Please see Exhibit 1 for their definitions.

Exhibit 1: Definitions – Material Carbon Issues

- Carbon – Own Operations refers to a company's management of risks related to its own operational energy use and GHG emissions (scope 1 and 2). It also includes transport and logistics, which are sometimes classified under scope 3 emissions.
- Carbon – Products and Services refers to a company's management of the emissions intensity of its products and services during the use phase. It does not include carbon risks related to financial services, which are considered within Carbon Finance.
- Carbon Finance refers to the integration of carbon and climate change considerations within financial and real estate portfolios. The issue is applicable for an institution's direct investments, corporate loans, financed projects and assets managed on behalf of clients.

The Two Dimensions of the Carbon Risk Ratings

Exposure and Management – the two dimensions of the risk ratings

The Carbon Risk Ratings' approach to materiality is based on a two-dimensional architecture. The first dimension, Exposure, reflects the extent to which a company is exposed to material carbon risks at the overall and the individual issue level, and the second dimension, Management, reflects how well a company is managing its exposure.

First Dimension: Exposure

Determined by a set of carbon-related factors that pose potential economic risks for companies

Exposure reflects the extent to which a company is exposed to material carbon risks. Another way to think of exposure is as a company's sensitivity or vulnerability to carbon risks. Exposure score for material carbon issues is first assessed at the subindustry level and are later refined to be company specific.

Exposure helps to determine the importance ascribed to material carbon issues. An issue with higher exposure will have a higher Contribution to the overall risk exposure of a company, and an issue with a lower exposure will have a lower contribution to a company's overall risk exposure. In other words, issues that are financially more material to a company weigh more heavily in the balance of a company's rating.

Assessing Exposure

Running through a top-down, 4-step process to arrive at final company exposure

The assessment of a company's exposure is done in four steps. As a starting point, the exposure of companies that operate in a given subindustry (as characterized by roughly similar products and business models) vis-à-vis the set of potentially relevant carbon issues is determined. The assessment at the subindustry level is done in a centralized and guided manner leveraging the expertise of research analysts and is updated annually. Issue Disabling and the Beta Assessment to reflect a company's specific exposure are part of the regular company research update process executed by the individual analyst researching a company. All three are key for making the Carbon Risk Ratings company specific, i.e., assuring that the rating properly reflects a company's individual business model and the environment it is operating in.

To summarize, the 4 steps to arrive at company-specific exposure are:

- **Step 1 - Subindustry Exposure Assessment:** Analysts determined the typical exposure of companies in a given subindustry.
- **Step 2 - Issue Disabling:** The analyst exercises professional judgement to decide if the issue is applicable to the specific company or if it should be disabled.
- **Step 3 - Beta Assessment:** For issues that have been identified to be material for a given subindustry, a beta is assessed at the individual company level, reflecting company-specific deviations from the subindustry norm.
- **Step 4 - Issue Exposure Score Calculation:** The exposure score is multiplied by the issue beta to arrive at final exposure score for a company vis-à-vis a material carbon issue.

Subindustry Exposure Assessment

Factors taken into account when assessing subindustry exposure

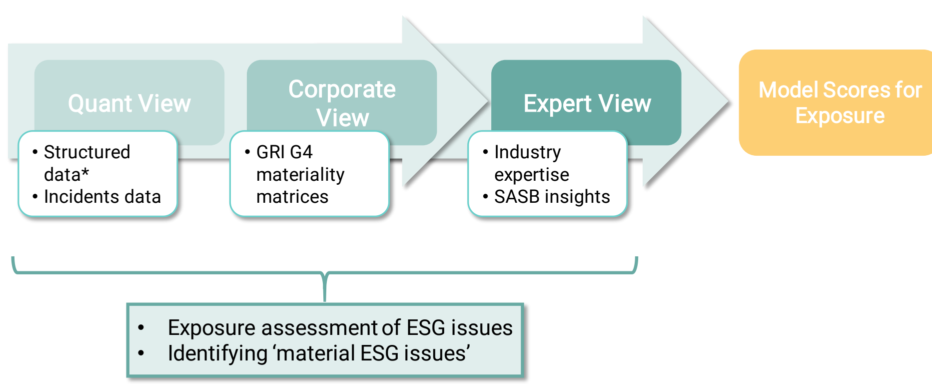
In order to set exposure scores at the subindustry level, research analysts considered companies' incidents/events track record, structured external data (e.g., CO_2 emissions), company reporting, and third-party research (e.g., regulatory news and third-party data).

Subindustry exposure scores get updated on an annual basis as a part of the Carbon Risk Ratings Review process which comprises an annual review of the model parameters of the Carbon Risk Ratings to ensure that the ratings reflect the dynamics in the underlying macro-factors. Those changes are then incorporated into the Carbon Risk Ratings.

As a part of the guided process, research analysts are asked to provide examples that explain:

- why each issue was material to a given subindustry;
- which type of impacts a business might experience from the issue;
- factors affecting exposure (risk drivers);
- whether the issue primarily affected revenues or costs;
- over which time horizon the issue is expected to materialize; and
- the probability of expected impact.

Exhibit 2: Subindustry Exposure Assessment Process



* for example: GHG emissions, water use, etc.

Source: Sustainalytics

Subindustry exposure scores in the Carbon Risk Ratings are set on a scale between 2 and 10, which is then multiplied by 4 in order to achieve a broad range of scores.

Based on this input, sector teams then determined the Subindustry Exposure score, which assesses the typical exposure of a subindustry to a material carbon issue. Similar to the ESG Risk Ratings, the subindustry exposure scores are initially set in a range between 2 to 10, with 2 indicating a low level of exposure and 10 indicating a high level of exposure for a subindustry. Exposure scores below 2 are considered immaterial. In a second step, the scores are multiplied by 4, which is the Thematic Exposure Multiplier for the Carbon Risk Ratings.

This factor is applied to exposure scores in Thematic Risk Ratings which evaluate a subset of ESG issues, including the Carbon Risk Ratings, as opposed to the ESG Risk Ratings, which evaluates all ESG issues. The thematic exposure multiplier ensures that the overall scores calculated by the rating are distributed across a broad range and are relatively comparable in scale to the overall scores of the ESG Risk Ratings. Consequently, the subindustry exposure scores for the Carbon Risk Ratings range from 8 to 40, with 8 indicating a low level of exposure and 40 indicating a high level of exposure for a subindustry. Carbon issues with exposure scores below 8 are considered immaterial.

Beta Assessment

Betas within the Carbon Risk Ratings allow for company-specific exposure assessments

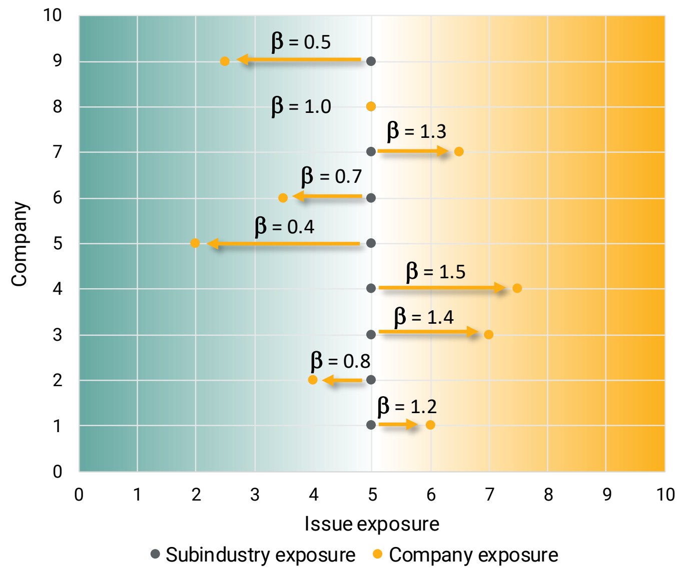
In mainstream finance, beta measures the risk of a security relative to a market benchmark. The concept of beta has been figuratively applied in the Sustainalytics' Risk Ratings, in which betas determine a company's exposure to a material issue relative to its subindustry's exposure to the same issue.

In the Carbon Risk Rating, exposure is defined against a set of carbon-related risk factors that pose potential financial risks to certain groups of companies. As described above, exposure is determined at a subindustry level by running through a guided process with sector teams. However, it is only with the use of betas that the subindustry exposure scores are adjusted to determine company-specific exposure.

Betas reflect how much a company's exposure deviates from the default exposure for its subindustry

In scoring terms, this means that betas are used to reflect how a company's exposure score (either for an issue or overall) deviates from its subindustry's exposure score. A subindustry exposure score is multiplied by a company's Issue Beta to derive a company-specific issue exposure score. As shown in Exhibit 3, even though each company in a subindustry has the same starting subindustry exposure, a company's exposure to an issue can be unique due to the application of company-specific betas.

Exhibit 3: Using Betas to Arrive at Company-Specific Exposure



Source: Sustainalytics

Betas are measured on an open-ended scale that starts at zero

In the Carbon Risk Ratings, issue betas are measured on an open-ended scale that starts at zero and rarely goes beyond 2. A beta of zero means that the company is not exposed to an issue. Such an issue would disappear from this company's rating model, or in other words gets disabled (see page 8). A beta of 2 means doubling the subindustry exposure score, i.e., if the subindustry exposure score is at 40, the company-specific exposure score would reach 80. This would also double a company's unmanaged risk on the issue (ceteris paribus).

Distinguishing between Manageable and Unmanageable Risks

Achieving more realistic and comparable rating outcomes by distinguishing manageable from unmanageable risks

The Carbon Risk Ratings distinguish between two types of risk, manageable and unmanageable risks. The intention for doing this is to achieve more realistic rating outcomes and to ensure the comparability of ratings across subindustries. Unmanageable risks are those risks that are outside the boundaries of a company management's control based on the assumption that the company continues to participate in the same business activities as today.

Example: Inherent product characteristics leaves some risk unmanageable

Take an integrated oil company, for example. As long as the company continues to be an oil company, i.e., selling fossil-fuel based products to its customers, a part of the company's exposure to the Carbon – Products & Services issue is not manageable.

Example: Technological boundaries leaves some risk unmanageable

Another example is airlines. For them, one of the most material carbon issues is the CO_2-emissions of their fleet, which is covered in the rating under Carbon – Own Operations. In this case the boundaries of manageability are set by technological constraints. Based on today's technology, an airline company cannot fully avoid the use of fossil fuels and, hence, some of these risks are considered unmanageable.

The amount of manageable risk may shift over time as new technologies are introduced

Obviously, the notion of unmanageable risk is based on the world of today and of the foreseeable future. At some point in the future, technology may provide solutions to issues that are currently considered unmanageable. For example, at some point in time, it is conceivable that emission free flights are possible. Hence, the assessment of manageability can change over time. But they are expected to do so to varying degrees. Relative to technological innovation, for example, other drivers of manageability such as human error and misconduct are inherently more stable.

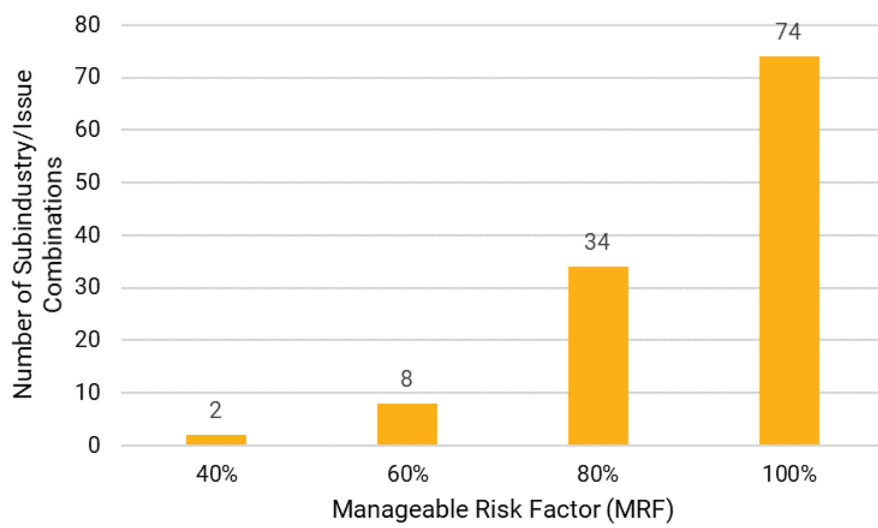
The Manageable Risk Factor

Manageable Risk Factors are determined at the issue and subindustry levels; they are updated on an annual basis

Technically speaking, the share of risk that is manageable vs. the share of risk that is unmanageable is determined at a subindustry level by a Manageable Risk Factor (MRF). MRFs range from 40% to 100% and represent the share of exposure to a material carbon issue that is deemed to be (at least theoretically) manageable by the company. MRFs get updated as a part of the annual Carbon Risk Ratings review (see page 6).

Exhibit 4 provides insight into how MRFs are currently distributed across the material carbon issues within subindustries. For most subindustries, the material carbon issues are believed to be 100% manageable. The highest degree of unmanageability is noted for Carbon – Products & Services in the Coal subindustry and Carbon – Own Operations in the Airlines subindustry. Both have manageable risk factors of 40%.

Exhibit 4: Distribution of Manageable Risk Factors per Subindustry and Carbon Issue



Source: Sustainalytics, as of April 2021

Second Dimension: Management

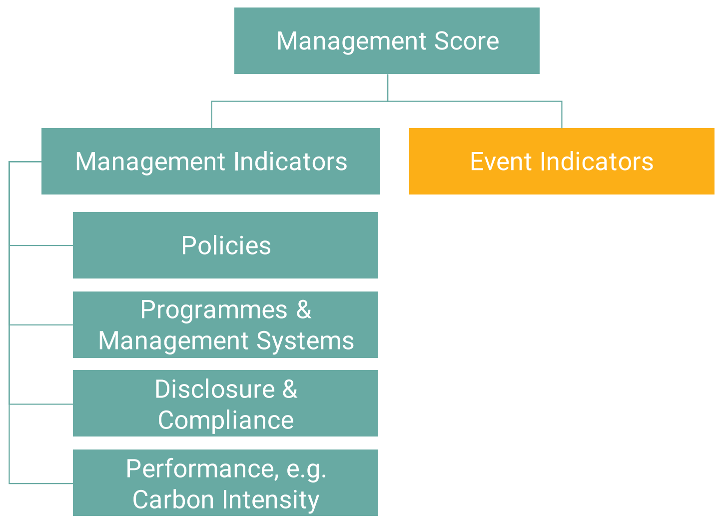
How well is a company managing its material carbon risks

The Carbon Risk Ratings' second dimension is Management. It can be considered as a set of company commitments, actions and outcomes that demonstrate how well a company is managing the carbon risks it is exposed to.

The Overall Management score for a company is derived from a set of Management Indicators (policies, management systems, certifications, etc.) and outcome-focused indicators. Outcome-focused indicators measure management performance either directly in quantitative terms (e.g., CO_2 emissions or CO_2 intensity) or via a company's involvement in controversies (represented by the company's Event Indicators).

Distinguishing between management, (quantitative) performance, and event indicators

Exhibit 5: Types of Indicators That Contribute to the Management Assessment



Source: Sustainalytics

Indicators are not exclusively linked to just one issue

For each material carbon issue/subindustry combination, management- and event indicators have been selected and weighted so that they collectively provide the strongest signal to explain and measure how well a company manages an issue. They may be applied to any issue where they are considered relevant and may therefore show up in the context of multiple material carbon issues.

Exhibit 6: Definitions – Management and Event Indicators

Management Indicator: An indicator that provides a signal about how effectively a company is managing (a part of) its exposure to a material issue through policies, programmes or quantitative performance, for example. Management indicators comprise a set of outcome categories with the one getting selected by the analyst determining the final indicator score. The score ranges between 0 (indicating no management) and 100 (indicating best practice).

Event Indicator: An indicator that provides a signal about a potential failure of management as reflected by an involvement in controversies. Events have a dilution effect on a company's management score for the respective material carbon issue. Any event indicator has a raw score of 0. The dilution effect is achieved by giving this score a weight in the overall management score calculation that increases with the severity of occurred events and their frequency.

Management Indicators

Systematic and consistent assessment

Management indicators are the smallest assessment unit used to measure a company's performance in managing its material ESG issues. They provide a systematic and consistent way of assessing clearly delineated and standardized criteria. These criteria speak to key areas of risk and benchmark a company's performance against relevant best practices. Management indicators are scored on a scale between 0 and 100.

Types of Management Indicators

Policy indicators

Policy indicators measure the strength and quality of an issuer's policy commitment to addressing a material ESG issue. One often-used policy indicator is Environmental Policy.

Programmes & Management Systems indicators

Programmes and Management Systems indicators evaluate a company's operational systems for managing its material ESG issues. These indicators are aligned with and reflective of recognized management systems, such as the ISO 14001 environmental management standard. Their assessment is based on the following criteria:

Assessment criteria

- Managerial responsibility
- Risk/impact assessment
- Training or other initiatives to ensure compliance with policies
- Objectives or targets
- Monitoring & measurement
- Incident investigation and corrective action.

Disclosure & Compliance indicators

Disclosure & Compliance indicators assess whether companies are sufficiently transparent to investors about their ESG risks and management practices. An example is *Scope of GHG Reporting* which assesses the degree to which a company reports on its carbon emissions.

(Quantitative) Performance indicators

(Quantitative) Performance indicators measure the effectiveness of policies, programmes and management systems and are tracked yearly to show a trend over time. For example, carbon intensity trend tracks a company's carbon emissions over time to provide information regarding the effectiveness of its carbon emissions reduction programmes.

Scoring of Management Indicators

Scoring Schemes

The scoring scheme related to the set of outcome categories

Different types of scoring schemes are used to assess different research questions. A scoring scheme is defined as a set of Outcome Categories that are comprised of a numerical value and a verbal description of what is behind the numerical value and how it needs to be interpreted. The outcome category that gets chosen by the analyst based on the available information determines the final Indicator Score.

Selection of Outcome Categories

Analysts directly select an outcome category

The management indicators are assessed in two different ways. For one group of indicators, research analysts select an outcome category for the respective indicator and thereby determine its final score. The choices made are qualitative assessment calls by research analysts, but they are based on clearly defined and delineated criteria and, hence, are done in a structured and systematic manner.

Tick-box based selection of an outcome category

For the second group of indicators, the selection of the outcome category is more formally structured with the help of a set of criteria (represented as tick boxes) which research analysts need to check when researching an indicator.

Event Indicators

Event indicators reflecting the track record for management failures on a specific topic

Event Indicators is the second type of indicators used for the assessment of Management, the second dimension of Sustainalytics' Risk Ratings. An event indicator provides a signal about the severity of a company's involvement in media-reported controversial activities. The indicator outcome typically reflects (potential) management failures or a track record of failures. In that sense event indicators are similar to performance indicators by nature.

Incident Assessments

Stakeholder impact and reputational risk

Technically speaking, an Event is based on a group or series of isolated or related incidents that pertain to the same material carbon issue. In turn, an Incident reflects a company's involvement in cases of specific alleged misconduct with negative environmental and/or social impacts. Incidents form the most granular level of controversy analysis. Incidents are identified based on a comprehensive daily media analysis. Research analysts provide two assessments at the incident level, a stakeholder impact assessment and a reputational risk assessment. Incidents typically inform the event indicator outcome for a period of three years (can be longer in exceptional cases).

Event Assessments

Additional layer of analysis

Events are classified into 5 thematic groups, each of which is represented by an event indicator. For example, a series of emissions scandals at a company forms an event under the event indicator EV.17 Environmental Impact of Products. To assess an event, research analysts consider the following three aspects:

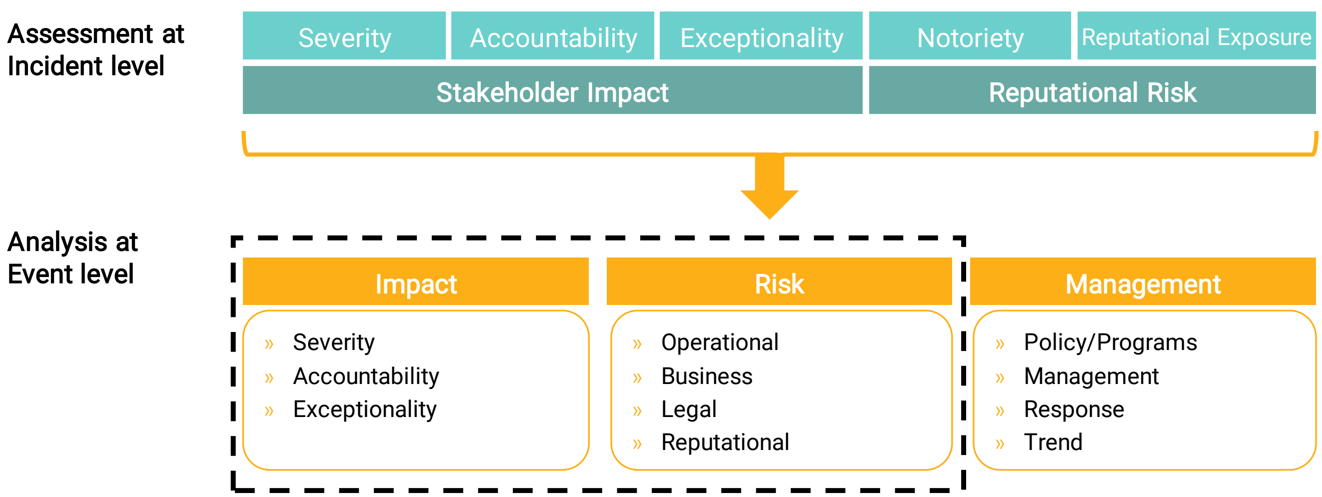
- **Impact:** Negative impact that the incidents have caused to the environment and society;

- **Risk:** Business risk to the company as a result of the incidents;
- **Management:** A company's management systems and response to incidents.

In their event assessment, analysts apply an additional layer of analysis, which means that the underlying incident scores are not the only and final determinant of the event indicator outcome. In particular, they may get overridden because of company's response to incidents or a broader business risk identified by the analyst.

Events are scored on a scale of 0 (no evidence of relevant incidents) to 5 (impact and risks are severe and irreversible). These 5 levels are called Event Categories. Exhibit 7 displays how the event assessments are derived based on incidents analysis.

Exhibit 7: Event Assessment Criteria and Factors



Source: Sustainalytics

Use of Event Indicators in the Carbon Risk Ratings

Material carbon issues can be supported by multiple event indicators

Event indicators are assigned to material carbon issues based on their relevance. Each individual issue can be supported by as many event indicators as necessary to maximize the power of the model. Any given event indicator may be used for multiple issue/subindustry combinations, if this helps to improve the model's quality. The use of this modeling option, however, is an exception, not the rule.

Dilution mechanism

Within the Carbon Risk Ratings, event assessments enter the management score calculation via a dilution mechanism called Events Weight Shift and is described in Exhibit 8. Together with management indicator scores, event scores get rolled up in a weighted manner to form the overall management score for a given issue. Technically speaking, this is accomplished by assigning a raw score of 0 to each event (independent of its category) and combining it with a weight that depends on the event category. The weight of the event in the scoring algorithm increases as the severity increases, acting as a discount to the other management indicators.

In this way, severe management failures can be distinguished from minor ones while acknowledging that any incident reflects weaknesses in company management.

Exhibit 8: Events Weight Shift

Event category	Category 0	Category 1	Category 2	Category 3	Category 4	Category 5
Event indicator raw score	0	0	0	0	0	0
Weight shift per event indicator*	0%	5%	10%	25%	50%	75%

* more than one event: addition of weight shift according to events category up to cap at 90%

Source: Sustainalytics

Calculating the Carbon Risk Ratings

Combining Exposure and Management

Designing a measure of unmanaged carbon risk

The Carbon Risk Ratings aim to provide investors with a signal that reflects the degree to which investments (single assets or portfolios) are exposed to carbon risks that are not sufficiently managed by companies. Hence, the final rating outcome has been designed as a measure of Unmanaged Carbon Risk, in which the two dimensions of the rating, Exposure and Management are assessed against each other at both the issue level and the overall level. Based on the (unmanaged) Carbon Risk Scores, companies are assigned to one of five categories of carbon risk.

Exhibit 9: Carbon Risk Ratings Categories – Overall

- **Negligible risk** (overall score of 0.00 points): Enterprise value is considered to have a negligible risk of material financial impact driven by carbon factors.
- **Low risk** (overall score of 0.01 to 9.99 points): Enterprise value is considered to have a low risk of material financial impact driven by carbon factors.
- **Medium risk** (10.00 to 29.99 points): Enterprise value is considered to have a medium risk of material financial impact driven by carbon factors.
- **High risk** (30.00 to 49.99 points): Enterprise value is considered to have a high risk of material financial impact driven by carbon factors.
- **Severe risk** (50.00 points and above): Enterprise value is considered to have a severe risk of material financial impact driven by carbon factors.

General Principle of Carbon Risk Ratings Scoring

Introducing a 'single currency' for carbon risk

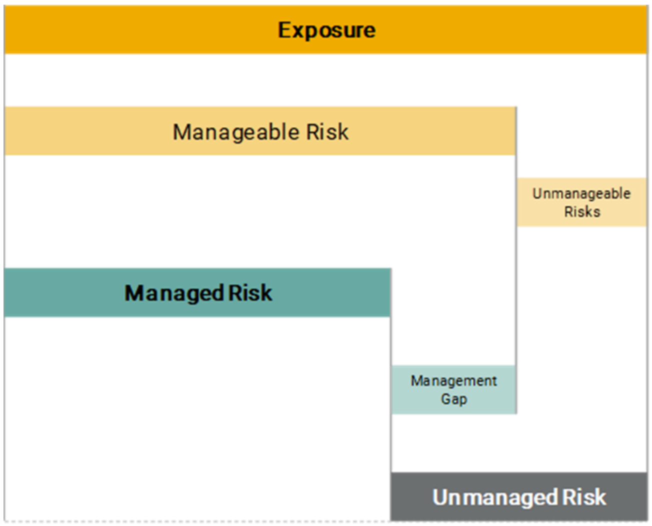
The five categories of risk in the rating are absolute, meaning that a 'high risk' assessment reflects a comparable degree of unmanaged carbon risk across all subindustries covered. This means that a bank, for example, can be directly compared with an oil company or any other type of company. One point of carbon risk is one point of carbon risk (equivalence principle), no matter which company or which issue it applies to, and points of risk add up across issues to create overall scores.

Risk Decomposition & Scoring Structure

The final Carbon Risk Ratings scores are a measure of unmanaged carbon risk, which is defined as the portion of material carbon risk that is not (yet) managed by a company. The Carbon Risk Ratings scoring system for a company is best thought of as a waterfall with four levels (applies to issue- as well as overall level).

Exhibit 10 shows an example for single material carbon issue, such as Carbon – Products & Services. The starting point at the top is a company's exposure to that issue, calculated as the product of the company's subindustry exposure and its issue beta.

Exhibit 10: Issue-Level Risk Decomposition



Company Exposure	=	Subindustry Exposure	*	Issue Beta	=	
	=	20.0	*	1.5	=	**30.0**
Manageable Risk	=	Company Exposure	*	MRF	=	
	=	30.0	*	90%	=	**27.0**
Managed Risk	=	Manageable Risk	*	Management score (as %)	=	
	=	27.0	*	75%	=	**20.3**
Unmanaged Risk	=	Company Exposure	*	Managed Risk	=	
	=	30.0	*	20.3	=	**9.7**

Source: Sustainalytics

Distinguishing between manageable and unmanageable risks

At the second level, Manageable Risk is separated from unmanageable risk with the help of the manageable risk factor (see page 12). In the example above 90% of the risk associated with the carbon issue at hand is considered manageable. Multiplied with exposure, this gives us the manageable risk for this issue and this company.

Deriving managed risk from manageable risk

At the third level, the Managed Risk score is derived from the manageable risk score by multiplying the latter with the management score (interpreted as a percentage number) that is based on a set of management and event indicators outcomes (see page 15). The part of manageable risk that is not managed is called Management Gap and is calculated by subtracting managed risk from manageable risk.

Subtracting managed risk from exposure

Finally, at the fourth level, Unmanaged Risk is calculated by either subtracting managed risk from exposure or by adding the management gap to the portion of risk that has been deemed unmanageable. In the example above, 9.7 points of risk out of a total of 30 remained unmanaged. After having evaluated all material carbon issues for a company, its final Carbon Risk Ratings score is calculated by summing up all individual issue-related unmanaged risk scores.

Appendix

Glossary of Terms

Beta

Assesses the degree to which a company's exposure deviates from its subindustry's exposure.

Beta Assessment

Part of the regular update of a company assessment where the analyst exercises professional judgement to decide to what degree/by which factor a company's exposure deviates from its subindustry exposure.

Carbon Risk Category

A company's Carbon Risk Rating is assigned to one of five carbon risk categories:

- **Negligible risk** (overall score of 0.00 points): Enterprise value is considered to have a negligible risk of material financial impact driven by carbon factors.
- **Low risk** (overall score of 0.01 to 9.99 points): Enterprise value is considered to have a low risk of material financial impact driven by carbon factors.
- **Medium risk** (10.00 to 29.99 points): Enterprise value is considered to have a medium risk of material financial impact driven by carbon factors.
- **High risk** (30.00 to 49.99 points): Enterprise value is considered to have a high risk of material financial impact driven by carbon factors.
- **Severe risk** (50.00 points and above): Enterprise value is considered to have a severe risk of material financial impact driven by carbon factors.

Note: Because carbon risks materialize at an unknown time in the future and depend on a variety of unpredictable conditions, no predictions on financial or share price impacts, or on the time horizon of such impacts, are intended or implied by these risk categories.

Carbon Risk Ratings

Sustainalytics' rating framework that measures the extent to which enterprise value is at risk, driven by carbon factors. The rating takes a two-dimensional approach. The exposure dimension measures a company's exposure to carbon risks, while the management dimension assesses a company's handling of these carbon risks.

A company's Carbon Risk Rating applies the concept of Risk Decomposition to derive the level of Unmanaged Risk for a company and is comprised of a quantitative score and a related Carbon Risk Category. The quantitative score represents units of unmanaged ESG risk with lower scores representing less unmanaged risk. It is calculated as the difference between a company's overall Exposure score and its overall Managed Risk score.

Carbon Risk Ratings Review

An annual review of the subindustry level assessments and model components underlying the Carbon Risk Ratings. The review ensures that the ratings reflect the dynamics in the underlying macro-factors, which drive the significance of exposure to material carbon issues on enterprise value.

Carbon Risk Score

Refers to Carbon Risk Ratings score.

Contribution

Refers to Issue Contribution.

Disclosure & Compliance

A type of Management Indicator that assesses whether companies are sufficiently transparent to investors about their ESG risks and management practices. Typically, they assess companies' use of generally recognized practices, such as reporting using the Global Reporting Initiative structure and including the fulfillment of respective requirements.

ESG Risk Ratings

Sustainalytics' rating framework that measures the extent to which enterprise value is at risk, driven by ESG factors. The rating takes a two-dimensional approach. The exposure dimension measures a company's exposure to ESG risks, while the management dimension assesses a company's handling of these ESG risks.

Event

A controversial activity of a company that is reported by the media. Typically, an event is based on a group or series of isolated or related Incidents that pertain to the same carbon issue.

Event Category	Refers to Event Indicator Category.
Event Indicator	An indicator that provides a signal about a potential failure of management as reflected by an involvement in controversies. Events have a dilution effect on a company's management score for the respective material carbon issue. Any event indicator has a raw score of 0. The dilution effect is achieved by giving this score a weight in the overall management score calculation that increases with the severity of occurred events and their frequency. Together with Management Indicators, event indicators form the Management dimension of the Carbon Risk Ratings.
Event Indicator Category (Event Category, Category)	Sustainalytics categorizes events that have resulted in negative ESG impacts into five event categories: Category 1 (low impact); category 2 (moderate impact); category 3 (significant impact); category 4 (high impact); and category 5 (severe impact).
Events Weight Shift	The dilution mechanism of Management Indicators that is applied in the Management dimension of the ESG Risk Ratings and triggered by Events. Technically speaking, this is accomplished by assigning a raw score of 0 to each event (independent of its category) and combining it with a weight that depends on the Event Category. The weight of the event in the scoring algorithm increases as the severity increases, acting as a discount to the other management indicators.
Exposure	One of the two dimensions of the Carbon Risk Ratings, this dimension reflects the extent to which a company is exposed to material carbon risks. Exposure can be considered as a sensitivity or vulnerability to carbon risks. Its final outcome is expressed in the Overall Exposure score. Also used as short form for Issue Exposure Score.
Incident	Reflects a company's involvement in cases of specific alleged misconduct with negative environmental and/or social impacts. Incidents form the most granular level of controversy analysis. They are identified based on a comprehensive media review that is conducted daily. Analysts provide two assessments at the incident level, a stakeholder impact assessment and a reputational risk assessment. Incidents typically inform the Event Indicator outcome for a period of three years.
Indicator Score (Indicator Raw Score, Raw Score)	The score that corresponds to the respective Outcome Category selected by the analyst during indicator research and applies to different types of indicators.
Issue Contribution (Contribution)	Used to express the contribution of an issue (or the baseline) to the overall Risk Rating in percentage terms. It refers generally to the Unmanaged Risk score, setting the unmanaged risk scores of the issue (or the baseline) in relation to the overall unmanaged risk score. Contributions can also be calculated based on Exposure scores or any other risk scores. **Note**: Issue contributions that are used on the risk/exposure side are different than the Issue Management Weights that are used on the management side.
Issue Disabling	Part of the regular update of a company assessment where the analyst exercises professional judgement to decide if the issue is applicable to a company or if it should be disabled (technically equal to setting an Issue Beta to 0).
Issue Beta (Beta, β)	A factor that assesses the degree to which a company's exposure deviates from its subindustry's exposure on a material issue. It is used to derive a company-specific Issue Exposure score for a material issue. It ranges from 0 to 10, with 0 indicating no exposure, 1 indicating the subindustry average (as represented by the subindustry exposure score), and 2 indicating exposure that is twice the subindustry average. Betas above 2 are rare.
Issue Exposure (Exposure)	A company's Exposure to a single Material Carbon Issue, expressed as a score. It is determined by the Subindustry Exposure Score for the issue and the company-specific Issue Beta.
Issue Manageable Risk	Refers to the part of Issue Exposure that can potentially be influenced and managed by a company through suitable policies, programmes and initiatives. It is determined by the Issue Manageable Risk Factor and expressed as a score ranging between 0 (indicating no manageable risk) and the issue exposure score.

Issue Manageable Risk Factor (Manageable Risk Factor, MRF)	A factor that assesses how much of a company's Issue Exposure is (theoretically) manageable by the company. The issue manageable risk factor is predetermined at the subindustry level. The factor ranges between 40% and 100%, with a low percentage indicating that a high level of the issue risk is considered unmanageable and 100% indicating that the issue risk is considered fully manageable. **Note**: Fully manageable does not mean that Sustainalytics believes there are no challenges or difficulties to managing the issue – rather, fully manageable indicates that there are no evident physical or structural barriers that make it impossible to fully manage the issue.
Issue Managed Risk	Refers to the part of the Issue Manageable Risk that the company has demonstrated to actually manage through suitable policies and programmes or initiatives as determined by the Issue Management and expressed as a score that ranges between 0 and the manageable risk score.
Issue Management Gap	The difference between what the company has actually managed through suitable policies and programmes or initiatives (Issue Managed Risk) and what is (theoretically) possible for the company to manage (Issue Manageable Risk).
Issue Management (Management)	Measures a company's handling of a single material issue and is used to calculate the Issue Managed Risk. It is expressed as a score that is calculated as the sum of all indicator weighted scores in an issue and ranges from 0 to 100, with 0 indicating no (evidence of) management of the issue and 100 very strong management of the issue.
Issue Management Weight	Refers to the relative contribution for each issue in the calculation of the overall management score. The issue management weight is calculated by dividing the Issue Manageable Risk score by the Overall Manageable Risk score.
Issue Unmanageable Risk	Refers to the amount of issue exposure that is deemed "unmanageable" and which cannot be mitigated by the company through management initiatives; it is expressed as a score that's calculated by subtracting the Issue Manageable Risk score from the Issue Exposure score. The score ranges from 0 to the issue exposure score, with 0 indicating that the issue risk is fully manageable, and a score equaling to the issue exposure score indicating that none of the issue risk is manageable.
Issue Unmanaged Risk	The portion of the issue exposure that a company either cannot manage (because it is unmanageable) or has not yet addressed through management initiatives (as demonstrated in relevant policies and programmes and proven track record). It is expressed as a score that's calculated by subtracting the Issue Managed Risk score from the Issue Exposure score and ranges from 0 (indicating no unmanaged risk) to the issue exposure score.
Manageable Risk	Refers to Issue Manageable Risk and Overall Manageable Risk.
Manageable Risk Factor	Refers to Issue Manageable Risk Factor and Overall Manageable Risk Factor.
Managed Risk	Refers to Issue Managed Risk and Overall Managed Risk.
Management	One of the two dimensions of Sustainalytics' Risk Ratings, this dimension measures a company's handling of Material ESG Issues through policies, programmes, quantitative performance and involvement in controversies. Its final outcome is expressed in the Overall Management score. Also used as short form for Issue Management score.
Management Gap	Refers to Issue Management Gap and Overall Management Gap.
Management Indicator	An indicator that provides a signal about how effectively a company is managing (a part of) its exposure to a material issue through policies, programmes or quantitative performance, for example. Management indicators comprise a set of Outcome Categories with the one getting selected by the analyst determining the final Indicator Score. The score ranges between 0 (indicating no management) and 100 (indicating best practice). Together with the Event Indicators, management indicators are used to form the Management score of a company.

Material Carbon Issue	A thematic issue that addresses a definite and specific carbon issue. Carbon issues are considered material when they have a significant effect on the enterprise value of a company and/or when it is likely that the issue can influence the decisions made by a reasonable investor. The material carbon issues are fundamental building blocks of the Carbon Risk Ratings. They are determined at a subindustry level through a structured consultation process with analysts but can be disabled for a company if the issue is not relevant to the company's business. **Note:** There are no specific predictions about financial impacts at the company level implied by the presence or absence of an issue as a material carbon issue.
Material ESG Issue	A thematic issue that addresses a definite and specific ESG issue. ESG issues are considered material when they have a significant effect on the enterprise value of a company and/or when it is likely that the issue can influence the decisions made by a reasonable investor. The material ESG issues are fundamental building blocks of the ESG Risk Ratings. They are determined at a subindustry level through a structured consultation process with analysts but can be disabled for a company if the issue is not relevant to the company's business.
Outcome Category	Refers to one out of several possible indicator outcomes. Sustainalytics indicators provide a systematic and consistent assessment of clearly delineated and standardized criteria at individual company level that are assessed by the analysts. The outcome category consists of a standardized text and an outcome score.
Overall Beta	A factor that assesses the degree to which a company's overall exposure deviates from its subindustry's overall exposure. It is calculated by dividing the company's Overall Exposure by the Overall Subindustry Exposure.
Overall Exposure	Relates to the Exposure dimension and measures the extent to which a company is exposed to ESG risks. The score is calculated as the sum of Issue Exposure scores.
Overall Manageable Risk	Refers to the material risk that can be influenced and managed through suitable policies, programmes and initiatives. It is expressed as a score that is calculated by multiplying the Overall Exposure score by the Overall Manageable Risk Factor. It can also be calculated as the sum of the manageable risks at the issue level. The score ranges from 0 to the company's overall exposure score with 0 indicating that no risk is manageable and the score equaling the company's overall exposure score indicating that the company's exposure is fully manageable.
Overall Manageable Risk Factor (Overall MRF)	Refers to the overall percentage of risk that can be managed by a company. It is calculated as a weighted average of the Issue Manageable Risk Factors or alternatively by dividing the Overall Manageable Risk score by the Overall Exposure score. The Overall MRF ranges between 40% and 100%, with a low percentage indicating that a high level of material carbon risk is considered unmanageable and 100% indicating that this risk is considered fully manageable.
Overall Managed Risk	Refers to material risk that has been managed by the company through suitable policies, programmes, or initiatives. It is calculated by multiplying the Overall Manageable Risk score by the Overall Management score and dividing by 100, or alternatively by subtracting the Overall Unmanageable Risk score and the Management Gap score from the Exposure score. It can also be calculated by summing the company's Issue Managed Risk scores. The score ranges from 0 to a company's overall exposure score, with 0 indicating that none of the company's ESG risks have been managed, and a score equal to the company's exposure score indicating that the company's ESG risks are fully managed.
Overall Management	Relates to the management dimension and measures a company's handling of risks across issues. It is expressed as a score that ranges from 0 and 100, with 0 indicating no (evidence of) management and 100 very strong management. It is calculated as a weighted sum of Issue Management scores. Note that the weights for are determined by calculating the Issue Manageable Risk in relation to Overall Manageable Risk.

Overall Management Gap	Represents the total amount of risk which the company could be managing but which it is not yet managing. It is calculated by subtracting the Overall Managed Risk score from the Overall Manageable Risk score or by summing the company's issue management gap scores. The score ranges from 0 to a company's overall manageable risk score, with 0 indicating that all of a company's manageable risk has been managed, and a score equaling a company's overall manageable risk score indicating that none of the company's manageable risk has been managed.
Overall Subindustry Exposure	Sustainalytics' assessment of a subindustry's overall exposure to material issues, expressed as a score and calculated by summing the Subindustry Issue Exposure scores.
Overall Unmanageable Risk	Refers to material risk inherent from the intrinsic nature of products or services of a company and/or the nature of a company's business, which cannot be managed by the company if the company continues to offer the same type of products or services and remains in the same line of business. It is expressed as a score and calculated by subtracting the Overall Manageable Risk score from the Overall Exposure score. It is derived by summing the company's issue unmanageable risk scores. The score ranges from 0 to the overall exposure score of the company, with 0 indicating that all of the company's ESG risks are fully manageable and a score equal to overall exposure indicating that no ESG risks are manageable.
Overall Unmanaged Carbon Risk (Carbon Risk Rating)	Refers to a company's overall score in the Carbon Risk Ratings that measures the extent to which enterprise value is at risk driven by carbon factors. It is considered the part of exposure that a company does not manage based on available information regarding policies, programmes, quantitative performance and event track record. The overall unmanaged carbon risk score is measured on an open-ended scale starting at zero (no risk) and a maximum score that is typically below 100.
Overall Unmanaged Risk (ESG Risk Rating)	Refers to a company's overall score in the ESG Risk Ratings that measures the extent to which enterprise value is at risk driven by ESG factors. It is considered the part of exposure that a company does not manage based on available information regarding policies, programmes, quantitative performance and event track record. The overall unmanaged ESG risk score is measured on an open-ended scale starting at zero (no risk) and a maximum score that is typically below 100.
Policy	A type of Management Indicator that measure the strength and quality of an issuer's policy commitment to addressing a material ESG issue.
Programme & Management Systems	A type of Management Indicator that evaluate a company's operational systems for managing its material ESG issues. These indicators are aligned with and reflective of recognized management systems, such as the ISO 9001 quality standard or the ISO 14001 environmental management standard.
Quantitative Performance (Performance)	A type of Management Indicator that measure the effectiveness of policies, programmes and management systems and are tracked yearly to show a trend over time.
Risk Decomposition	Describes the logic that distinguishes different types of risk that contribute to Exposure to derive Unmanaged Risk scores and is applied on the overall level as well as on the issue level. The Risk Ratings differentiate Unmanageable Risks, which cannot be addressed through company initiatives, from Manageable Risks, which can be addressed. Manageable risks are assessed as either managed by companies through suitable policies and programmes, etc. (Managed Risk), or as not managed by companies (Management Gap). Unmanageable risk and management gap can be added up to arrive at the unmanaged risk of a company at the issue- or overall level.
Scoring Model	Refers to the quantitative model behind a rating. The scoring model uses a scoring algorithm that combines indicator scores and model parameters (such as indicator weights) to arrive at the final rating outcome.

Subindustry Issue Exposure (Subindustry Exposure)	Sustainalytics' assessment of a subindustry's Exposure to a Material ESG Issue and expressed as a score. The scores have been determined through a structured consultation process and form the starting point from which analysts derive company-specific Issue Exposure scores using Issue Betas. They are updated as part of the annual Carbon Risk Ratings Review and range for Carbon from 8 to 40, with 8 indicating a low level of exposure and 40 indicating a high level of exposure.
Sustainalytics Subindustry (Subindustry)	Sustainalytics subindustries are defined as part of Sustainalytics' own classification system; the number of subindustries in the Sustainalytics subindustry classification system is 138.
Thematic Exposure Multiplier	A factor applied to issue exposure scores in Thematic Risk Ratings focused on a subset of ESG issues as opposed to the ESG Risk Ratings, which addresses all ESG issues. The thematic exposure multiplier ensures that the overall scores calculated by a thematic risk rating are distributed across a broad range and are relatively comparable in scale to the overall scores of the ESG Risk Ratings. The multiplier can be different for each thematic risk rating, depending on the number of issues being assessed.
Thematic Risk Ratings	A Risk Rating that is set up based on the same considerations and principles as the ESG Risk Ratings but focuses on the evaluation of a subset of ESG issues rather than all ESG issues. An example of a thematic risk rating is the Carbon Risk Ratings.
Unmanageable Risk	Refers to Issue Unmanageable Risk and Overall Unmanageable Risk.
Unmanaged Risk	Refers to Issue Unmanaged Risk and Overall Unmanaged Risk.

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