TECHNICAL DOCUMENTATION

Data Quality Scores

Scientific Climate Ratings
An EDHEC Venture

V1.00.01 – July 2025

About Scientific Climate Ratings

Scientific Climate Ratings is a new venture born from EDHEC's Climate Finance applied research ecosystem. It delivers forward-looking ratings that quantify the financial materiality of climate risks for infrastructure companies and investors worldwide. Leveraging high-resolution geospatial data, proprietary climate risk models, and the world's largest financial dataset for infrastructure assets, Scientific Climate Ratings evaluates both transition risks (linked to the shift toward a low-carbon economy) and physical risks (arising from climate hazards such as floods, storms, heatwaves, and wildfires).

The ratings offer a dual perspective:

- Potential Climate Exposure Ratings assess current exposure to future climate risks under a "continuity" scenario, reflecting the most likely pathway based on today's global policies and trends.
- Effective Climate Risk Ratings go further by integrating climate risk data into financial valuation models across multiple scenarios — each weighted by its probability of occurrence — to estimate the financial effects of climate-related risks until 2035 and 2050.

While initially focused on infrastructure, Scientific Climate Ratings will soon extend its methodology to the listed equities segment, applying the same scientific rigor and forward-looking approach to a broader set of financial assets.

Scientific Climate Ratings aims to set a new standard in climate risk management — driving informed and responsible decision-making for a more resilient future.

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1. Introduction

Scientific Climate Ratings provides a clear measure of the financial impact of climate risk exposure for infrastructure companies. These ratings cover two key types of risks:

- Transition Risk: The financial impacts of moving toward a low-carbon economy, such as regulatory changes and shifts in reputation.
- Physical Risk: The potential damage and disruptions caused by physical climate events affecting infrastructure assets and operations.

To develop these ratings, we leverage diverse datasets, focusing on the most accurate and granular data available at the company and sector levels. However, data quality challenges and occasional gaps in data availability mean that we sometimes rely on models and estimates to ensure comprehensive assessments.

Data Quality Scores (DQSs) play a pivotal role in this process, offering a standardised metric to evaluate the data's completeness, consistency, and relevance. For example, the Partnership for Carbon Accounting Financials (PCAF) employs a 1 to 5 scale to assess the reliability of carbon emissions data, with lower scores indicating higher data quality. Inspired by PCAF, we apply a similar data quality scoring framework to each input variable, carefully tracking data sources. This approach provides users with transparency on the reliability of the data that informs our climate ratings.

This document details the methodology behind the DQSs, explaining how each score is assigned and applied to the input data used in our ratings. For a deeper look at how each data point contributes to the ratings, please refer to our methodology documents.

Each rating transparently discloses the DQS, enabling users to assess the precision of each data component. This scoring system highlights not only the strength of our data but also the importance of accurate data contributions from rated companies. By providing reliable information, companies can enhance the credibility of their ratings, ensuring a more accurate representation of their climate risk profile.

The DQS scale also highlights the trade-off between data availability and accuracy. This scale guides stakeholders in understanding the confidence level of reported data and helps identify areas for improvement in data quality, aiding more informed decision making.

2. Framework of Data Quality Scoring: Rating Scale

The DQSs range from 1 to 5, where a score of 1 represents the highest quality data (accurate, complete, and up-to-date) while a score of 5 indicates data that may be subject to uncertainty (see Table 1).

Table 1: Rating scale representing the general framework of the Data Quality Scores

	Score	Description
1	Highest Data Quality	This score represents data that is **directly measured, accurate, and verifiable**. It is based on primary, actual data from reliable sources.
2	High Data Quality	This score represents data that is **partially measured but still largely reliable**. It may include a combination of measured and calculated data or data with some assumptions.
3	Moderate Data Quality	This score represents data that involves **significant estimations or approximations** but still uses industry-accepted methods and some primary data. There is a higher degree of uncertainty compared to scores 1 and 2.
4	Low Data Quality	This score represents data that is **mainly estimated with considerable assumptions**, using generic or regional averages rather than specific data. It lacks accuracy and is less reliable.
5	Lowest Data Quality	This score represents **uncertain data**, based on rough estimates or default values. It involves significant assumptions and lacks a strong empirical basis.

In the following section, we apply our DQSs to the inputs used in our climate ratings. These scores are only provided for variables that incorporate a range of data sources with varying levels of precision, as these differences can impact the confidence of the results.

3. Data Quality Scores: Transition Risk Rating

3.1. Scope 1 and 2 Emissions

The DQS table for transition risks outlines a hierarchy of data sources used to estimate Scope 1 and 2 emissions, ranked from highest to lowest quality. At the top of the scale, DQS 1 represents emissions data directly reported by companies using well-established measurement methods, ensuring high accuracy and reliability. As the DQS level increases, the data source becomes less specific, moving from company-reported data to estimates based on broader industry averages or economic factors. DQS 2 relies on company-specific data, while DQS 3 and DQS 4 incorporate sector and regional averages. The scale reflects a trade-off between data specificity and the need for estimation when direct data is unavailable.

Users have the option to contribute information on the specific strategies they use to reduce emissions, allowing us to adjust our outputs accordingly. When companies report these adjustment strategies, the Data Quality Score improves by 0.5. This incremental increase reflects that while these adjustments enhance the quality of available information, they remain external to the core data used in the modelling process. By keeping these inputs exogenous, we acknowledge the added value of company-specific insights without compromising the objectivity of the core data used in the modelling process.

The breakdown of Scientific Climate Ratings' Data Quality Scores for the data used to quantify Scope 1 and Scope 2 emissions is presented in Table 2 and summarised in Figure 1.

Table 2: Data Quality Scores for the data used to quantify Scope 1 and 2 emissions

DQS	Options to model Scope 1 and 2		Underlying data types used	Example
1	Option 1: Reported emissions	1a	Emissions data **publicly reported** directly by the company, measured through well-established methods.	Data available in a sustainability report.
1.5		1b	Emissions data **privately reported** directly by the company, measured through well-established methods.	Emissions privately contributed by the company through the adjustment process.
2	Option 2: Estimated emissions using company-specific data	2a	Estimated emissions calculated using one or more types of **company-level physical activity data**, such as physical characteristics or measures of consumption, production, or usage.	Calculating emissions for a power plant by multiplying the company's power production with a physical emission factor (e.g., emissions per unit of power produced).
2.5		2b	Estimated emissions calculated using one or more types of **company-specific economic activity data**, such as a company's revenue.	Computing emissions of a power plant by multiplying revenue with the historical emissions to revenue ratio.
3	Option 3: Estimated emissions using sector-country-specific data[1]	3a	Estimated emissions calculated using one or more types of **country- and sector-level physical activity data**, such as physical characteristics, or measures of consumption, production, or usage.	Computing emissions of a coal power plant by multiplying the average power produced by coal-fired power plants in a given country, with a physical emission factor (emissions per unit power produced).
3.5		3b	Estimated emissions calculated using one or more types of **country- and sector-level economic activity data**.	Computing emissions of a coal-fired power plant by taking the economic output of the coal-based power sector in a given country and multiplying it by an emission intensity factor (emissions per dollar of economic activity in the coal power sector).
4	Option 4: Estimated emissions using generic information[2]	4a	Estimated emissions calculated using **physical activity data** such as physical characteristics or measures of consumption, production, or usage at a resolution higher than the asset's specific sector and country.	Computing emissions of a coal power plant by multiplying the average power produced by all types of fossil fuel power plants in a continent or globally with a physical emission factor (emissions per unit power produced).
4.5		4b	Estimated emissions calculated using one or more types of **economic activity data** at a resolution higher than the asset's specific sector and country.	Computing emissions of a power plant by multiplying the revenue of a power plant with the average historical ratio of its emissions to revenue of a given type of power plant (i.e., coal-fired power plant in each country).
5	Option 5: Estimated emissions using portfolio comparisons	5a	Emissions are estimated using portfolio comparisons.	This approach estimates the emissions of a given company in a portfolio by leveraging data from a comparable portfolio of similar assets with known emissions profiles.

[1] "Country" refers to the nation where the asset is located. For infrastructure assets, "sector" refers to its specific TICCS class.

[2] "Country" refers to a nation different from where the asset is located or as an average across multiple countries or at a continental or global scale. For infrastructure assets, «sector» refers to a classification broader than the specific TICCS class assigned to the asset.

For more information on TICCS, visit: https://sipametrics.com/private-infrastructure/ticcs/

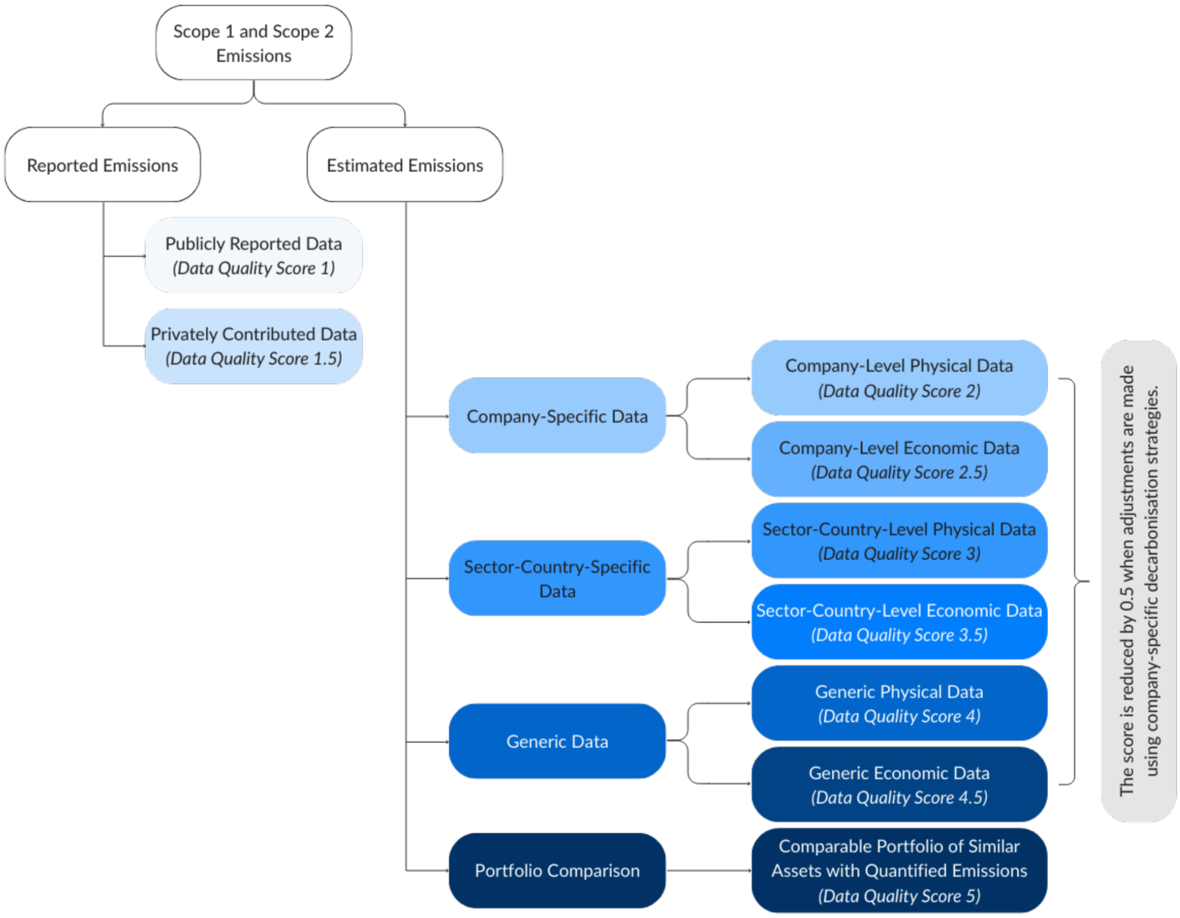

***Figure 1:** Summary of the Data Quality Scores for the data used to quantify Scope 1 and Scope 2 emissions*

3.2. Scope 3 Emissions

Given the uncertainty in estimating Scope 3 emissions, our methodology does not accept reported Scope 3 emissions. In the future, with a better understanding and a standardised methodology for such estimations, the quality of this information is expected to improve.

The DQS table for Scope 3 emissions reflects the inherent challenges and uncertainties in accurately measuring Scope 3 data. Due to the complexity and indirect nature of Scope 3 emissions, the table excludes the highest DQS levels (1 and 2) that are reserved for directly reported or highly specific data, as Scope 3 estimations rarely achieve this level of precision. Instead, Scope 3 emissions are only assessed at lower DQS levels (3, 4, and 5). DQS 3 and 4 apply when company-specific physical and economic activity-based data is used. DQS 5 applies to broader estimates based on sector or country averages and non-activity-based data.

This structure reflects the greater reliance on estimates and assumptions for Scope 3 emissions, underscoring the limitations in precision. As such, these scores provide users with a realistic view of the confidence level associated with Scope 3 data, acknowledging the trade-off between data availability and accuracy in this complex emissions category.

Users have the option to contribute information on the specific strategies they use to reduce emissions, allowing us to adjust our outputs accordingly. When companies report these adjustment strategies, the DQS improves by 0.5. This incremental increase reflects that while these adjustments enhance the quality of available information, they remain external to the core data used in the modelling process. By keeping these inputs exogenous, we acknowledge the added value of company-specific insights without compromising the objectivity of the core data used in the models.

The breakdown of Scientific Climate Ratings' Data Quality Scores for the data used to quantify Scope 3 emissions is presented in Table 3 and summarised in Figure 2.

Table 3: Data Quality Scores for the data used to quantify Scope 3 emissions

DQS	Options to model Scope 3		Underlying data types used	Example
1	NA			
2	NA			
3	Option 1: Estimated emissions using physical activity-based models	3a	Estimated emissions calculated using one or more types of **physical activity data**, such as physical characteristics or measures of consumption, production, or usage.	Calculating Scope 3 emissions of an airport using detailed flight information.
4	Option 2: Estimated emissions using economic activity-based models	4a	Estimated emissions calculated using one or more types of **economic data**.	Calculating Scope 3 emissions of an airport using its revenue together with an economic emissions factor (e.g., revenue-to-emissions ratio).
5	Option 3: Estimated emissions using non-activity-based models	5a	Estimated emissions calculated using **generic data**.	Calculating Scope 3 emissions of an office building based on the generic emissions intensities and office sizes of a given country.

Note: In this context, the data can either be 1) country-sector data or 2) other types of data that are not physical or economic by nature, for example, the number of employees.

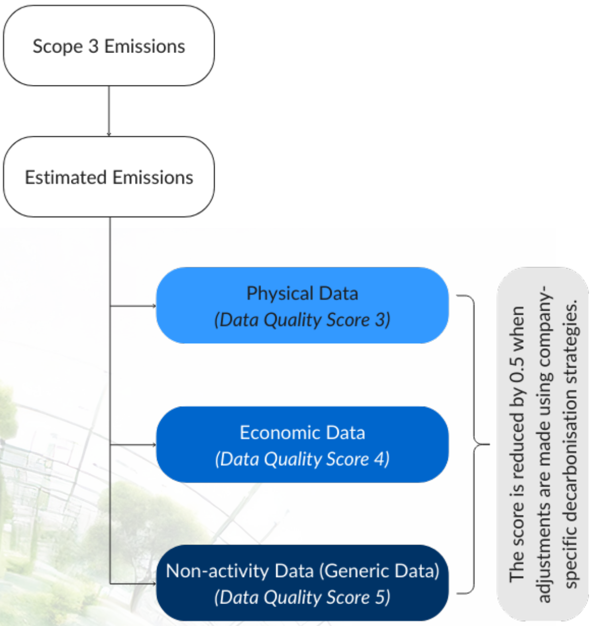

Figure 2: Summary of the Data Quality Scores for data used to estimate Scope 3 emissions

4. Data Quality Scores: Physical Risk Rating

4.1. Geolocation Information

The DQS table for physical risks provides a structured hierarchy of data sources used to determine the geolocation of assets, ranked from the highest to lowest quality in terms of data precision. At the top of the scale, DQS 1 represents the most precise geolocation data, utilising high-resolution, detailed polygons that capture the exact geographic footprint of an asset, such as mapping a power station with a complete boundary outline. As the DQS level increases, the specificity of geolocation data decreases, moving from those with highly detailed asset boundaries to more generic estimates.

DQS 2 continues to use detailed boundary data, though in the form of line shapefiles, which are ideal for linear assets like road networks. DQS 3 involves verified point locations, providing an exact, GPS-verified coordinate for assets, such as marking the centre of a solar farm. As we progress to lower levels of data quality, DQS 4 relies on estimated point locations derived from known addresses, offering reasonable accuracy for assets where only the address is available. Finally, DQS 5 represents the least specific data, using generic location information that offers only an approximate asset position based on broader regional data, such as identifying the generic area served by a pipeline network.

This hierarchy reflects the balance between data specificity and the need for estimation when detailed geolocation data is inaccessible. By following this structured approach, the DQS framework enables users to gauge the confidence level associated with each geolocation estimate, providing valuable transparency and supporting more informed decision-making based on the quality of geolocation data.

The breakdown of Scientific Climate Ratings' Data Quality Scores for geolocation data is presented in Table 4 and summarised in Figure 3.

Table 4: Data Quality Scores for geolocation data.

DQS	Options to model geolocation	Description	Example
1	Detailed Polygon	High-resolution polygon data that clearly identifies individual asset components and boundaries.	Mapping an airport, clearly identifying the terminals, runways, etc. following its detailed geographic footprint.
2	Detailed Asset Boundary	Outline of the asset boundary that includes the generic outline but lacks detailed identification of individual components.	Mapping a power plant following its detailed geographic footprint without knowing specific structure identifiers (e.g., boiler, building, etc.).
3	Verified Point Location (coordinates)	Precise, verified point location represented by multiple coordinate points.	Mapping a road by plotting verified coordinates at its start, end, and key bends or intersections.
4	Estimated Point (exact address)	Estimated asset location based on the known exact address.	Location derived from an available verified address.
5	Estimated Point (generic location)	Estimated asset location derived from non-specific sources, such as generic location data or approximate geocoordinates not tied to an exact address.	Approximate location based on knowing only the region served by a pipeline network.

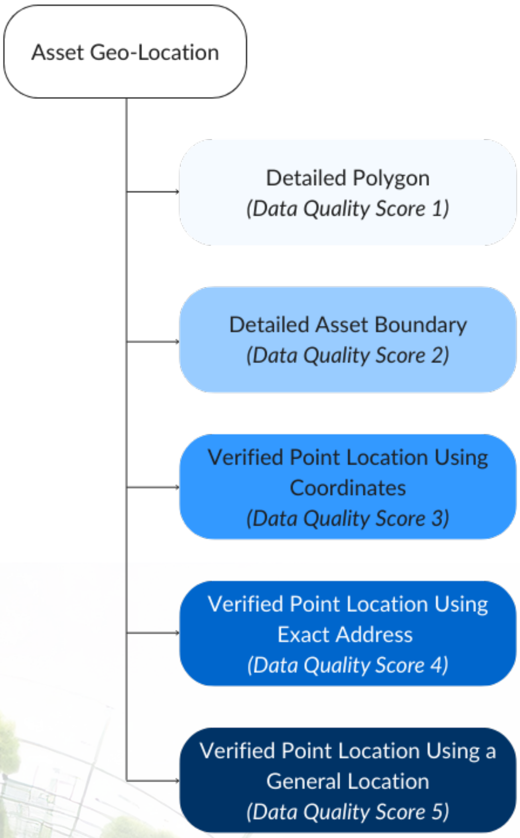

Figure 3: Summary of the Data Quality Scores for geolocation data

5. Continuous Improvement and Future Development

Plans for Enhancing the Methodology

We are committed to continuously refining our data quality scoring methodology to ensure it remains robust, accurate, and relevant. Planned enhancements include periodic reviews and updates based on advancements in data collection, modelling, and analysis techniques.

Feedback Mechanism

User feedback is essential for the ongoing development of our methodology. We encourage users to share their insights and suggestions for improving the data quality scoring system. Feedback can be submitted through our contact channels, and we will consider it during future updates.

Alignment with Evolving Standards

We are dedicated to aligning our methodology with evolving industry standards and best practices. As data quality and climate risk assessment standards continue to advance, we will adapt our approach to ensure our Data Quality Scores reflect the latest benchmarks, enhancing the reliability and transparency of our ratings.

Usage Guidance

The Data Quality Scores should be viewed as a tool to assess the relative robustness of datasets and inform decision-making processes. They are not a substitute for thorough due diligence or expert evaluation. Users should consider these scores in conjunction with the broader context, including the specific objectives of their analysis, sectoral nuances, and the inherent variability of data collection practices across different sources.

These scores are independent of the quality or robustness of the methodologies or models applied to the data. A lower DQS does not necessarily imply inadequacies in the modelling process, nor does a higher score guarantee the absolute accuracy of the resulting analysis.

Users are encouraged to interpret these scores within the specific context of their application and not as standalone determinants of overall analytical reliability. Integrating lower-quality data into robust, well-constructed models can still yield valuable insights, whereas even high-quality data may require critical evaluation to ensure its suitability for specific applications.

By relying on these scores, users accept their inherent limitations and agree that they should be used in combination with expert judgment and domain-specific considerations.

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