

White Paper

# Assessing How Megatrends May Influence Credit Ratings

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*Editor's Note: Here, S&P Global Ratings outlines key concepts that help it assess the credit materiality of megatrends and how that credit materiality might influence credit ratings, now and in the future, using climate change as an example. This paper relates to all foundational criteria articles used to assign credit ratings.*

*This report does not constitute a rating action*

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## Assessing How Megatrends May Influence Credit Ratings

Global risk trends such as climate change, increasing digitalization, geopolitical risks, aging populations, and disruptive technologies like artificial intelligence are gradually reshaping our world, and often in unpredictable ways. For some of these so-called megatrends, the impacts may take several years to unfold, for example, sea level rise linked with climate change. Others may emerge suddenly, such as after events like severe hurricanes, wildfires, escalation of armed conflict, or major cyber attacks.

### Why it matters

Megatrends typically have regional or cross-sector implications, as well as the power to transform societies and economies. They bring with them financial, economic, environmental, and other risks, including social unrest and supply chain disruptions. They may also offer opportunities.

### What we think and why

S&P Global Ratings believes megatrends can become material to its credit ratings--in other words, have credit materiality--if they affect factors that contribute to its assessment of creditworthiness. Some megatrends have already led to credit rating changes and, depending on how they evolve, may do so in the future.

#### Potential impacts of megatrends are considered in our credit analysis

Our credit rating methodologies, which are continuously fine-tuned, provide the analytical approach to capture factors linked to megatrends that can materially affect creditworthiness of markets, industries, and issuers. In our analysis, we take a forward-looking view of risks or opportunities that can alter the trajectory of the credit factors underpinning our ratings.

Yet it is inherently difficult to predict how, where, and when megatrends may develop, the severity and distribution of their impacts, or precisely how and when creditworthiness might be affected. Moreover, we recognize that, when it comes to the impacts of megatrends, the path to credit materiality is often not linear, can develop over different time frames, and may affect sectors and regions differently.

**Here we outline a five-step process** that helps us monitor the potential evolution of megatrends, understand the key tipping points, and assess the likely impact on our credit ratings, now and in the future. Details of how we approach this process are in the next section of this paper but, in summary, we:

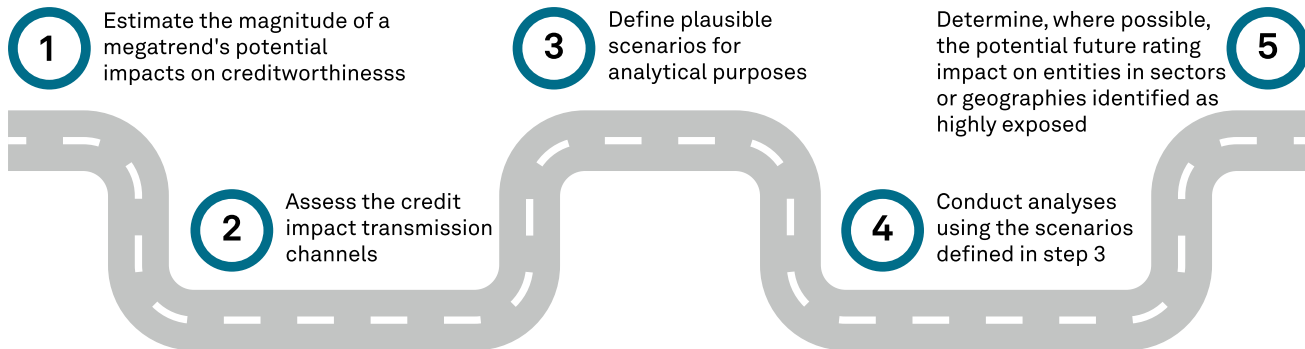
1. Estimate the potential magnitude (severity and likelihood) of the megatrend's impacts.
2. Assess the potential channels through which the impacts of megatrends may be transmitted to relevant credit factors described in the applicable rating methodology (for example, revenue, costs, taxation), and the clarity of those channels in view of the potential magnitude.
3. Define plausible scenarios in which to conduct sensitivity analyses or stress tests involving relevant credit factors for the sectors and geographies that we consider most exposed.
4. Conduct those analyses and evaluate the results, armed with analytical insight and extensive data, including from market participants and other sources.
5. Determine potential credit rating impacts, their likely extent, and the possible time frame.

## Assessing The Credit Materiality Of Megatrends

The concepts outlined in this five-step process support our understanding of how a megatrend may unfold and how specific mitigants may help entities respond to these developments. This is a dynamic process and is part of our continuous monitoring of risks and factors that can affect our ratings.

Chart 1

The road to credit materiality: Five steps from megatrend to credit impact



Source: S&P Global Ratings.

### Step 1: Estimate the magnitude of a megatrend's potential impacts on creditworthiness

We make this estimate irrespective of how or when impacts might materialize. Magnitude can be described as the product of the potential severity of a megatrend's impacts and the potential likelihood of those impacts occurring.

**An assessment of the magnitude of a megatrend's impacts would result from our analytical insights globally and across sectors.** We monitor top risks. Each quarter, our credit conditions committees identify base case (including updated macroeconomic and fiscal forecasts) and downside scenarios, and rank exogenous risks. These views are cascaded to our analytical teams to inform their rating deliberations (for the latest reports, see our dedicated [Credit Conditions webpage](#)).

### Step 2: Assess the credit impact transmission channels

Here we examine whether the megatrend can affect the key credit factors set out in our sector-specific rating methodologies, such as competitive position, revenue, expenses, investment needs, access to funding, tax base, and jurisdictional factors, among others. At the same time, we assess whether the credit impacts from the megatrend could happen now or in the future.

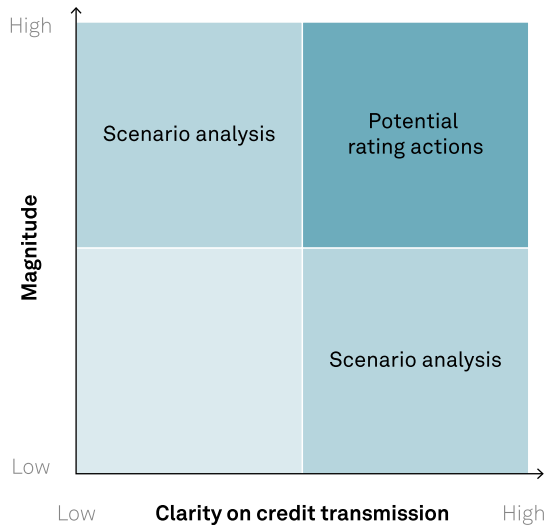
**Although, in our view, a megatrend may have credit materiality several years in the future, at this stage the aim is to understand the means by which this may occur.** Credit impact transmission channels, which correspond to credit factors as outlined above, indicate how the megatrend could influence an entity's ability and/or willingness to repay its financial obligations.

## Assessing How Megatrends May Influence Credit Ratings

For a megatrend's credit materiality to be high (see chart 2: top right quadrant), and therefore potentially lead to a change in our rating or outlook, both its magnitude (step 1) and the clarity of credit transmission (step 2) need to be sufficiently high.

Chart 2

### Assessing a megatrend's credit materiality



Source: S&P Global Ratings.

**Yet, we are mindful that a megatrend's path to credit materiality is not the same for all rated entities in all sectors and geographies.** When there is sufficient clarity about the credit impact transmission channels for certain sectors or geographies, our sector-specific credit analysis already reflects longer-term risks and opportunities emanating from the particular megatrend.

**In sectors and geographies where it is uncertain how risks and opportunities from a megatrend might affect creditworthiness, there is likely to be no credit rating impact based solely on that megatrend.** In cases where we are uncertain about either of the two dimensions (that is, the magnitude or the clarity of the credit impact transmission channels), but assess one of the two dimensions as high enough to potentially influence creditworthiness, we may use scenario analyses (see chart 2; top left and bottom right quadrants).

**The critical role uncertainty plays is also embedded in our rating methodologies.** This role is summarized in the five general principles of how environmental, social, and governance credit factors can influence credit ratings (see chart 3, taken from "[Environmental, Social, And Governance Principles In Credit Ratings](#)," Oct. 10, 2021).

## Assessing How Megatrends May Influence Credit Ratings

Chart 3

### General principles of how ESG credit factors can influence credit ratings

#### Principle One

Our long-term issuer credit ratings do not have a pre-determined time horizon.

#### Principle Two

The current and potential future influence of ESG credit factors on creditworthiness can differ by industry, geography, and entity.

#### Principle Three

The direction of and visibility into ESG credit factors may be uncertain and can change rapidly.

#### Principle Four

The influence of ESG credit factors may change over time, which is reflected in the dynamic nature of our credit ratings.

#### Principle Five

Strong creditworthiness does not necessarily correlate with strong ESG credentials and vice versa.

ESG--Environmental, social, and governance. Source: S&P Global Ratings.

### Step 3: Define plausible scenarios for analytical purposes

For the sectors and geographies we consider to be typically most exposed to the megatrend, the scenarios (see chart 2) could take various forms and have different impacts. The scenarios use factors taken from our sector-specific rating methodology, and range from simple sensitivity tests to analyze the effect of changes in one variable, to more-complex scenarios that take into account second-order effects or assumed changes in the macroeconomic environment. We may also adjust certain scenarios to make them more relevant to specific sectors and/or geographies, or we may define additional scenarios in some cases.

### Step 4: Conduct analyses using the scenarios defined in step 3

In this step, the aim is to determine potential impacts of the megatrend on those sectors and geographies identified as likely to be most exposed. This process could also entail deeper assessments of sectors or market dynamics. These analyses and assessments would affect specific factors relevant to those sectors, according to our rating methodology. They would be complemented by information gleaned from our interactions with issuers and other relevant stakeholders, thereby providing deep knowledge, expertise, and perspectives.

### Step 5: Determine, where possible, the potential future rating impact on entities in sectors or geographies identified as highly exposed

The outcomes of this process are not homogeneous. They depend on the scenarios used, the characteristics of the sector, time frame, applicable sector-specific rating methodology and on

each entity's specific circumstances and business model. For instance, for a specific sector or geography, we may conclude that we do not see a path to credit materiality of a megatrend for at least the next five or six years, for most rated entities, and that uncertainty remains significant beyond this time frame.

However, we might envision rating pressure for some entities much later if specific scenarios materialize. In doing so, we would incorporate our view of how each rated entity is likely to manage the risks or opportunities posed by the megatrend, considering for example its financial situation, governance, technological and product flexibility, and shareholders, as well as the legal and regulatory framework it operates in.

For this reason, when making assessments over the medium and long term, we also make assumptions on potential mitigants an entity might put in place and their potential effectiveness.

## The Five-Step Process In Practice: From Climate Change To Rating Impact

Here we provide an example of how the concepts outlined in the five-step process help to assess credit materiality through the lens of the climate change megatrend.

### Step 1: Estimate the magnitude of a megatrend's potential impact on creditworthiness

Climate change has a global impact and is a source of transition risks and physical risks. Climate transition risks include notably those related to policy, legal, technology, and market changes or requirements related to mitigating or adapting to the impacts of climate change. Physical risks stem from the increasing incidence and severity of climate hazards such as storms, floods, or wildfires, among others. These may be acute isolated events or chronic risks that develop over the medium to long term, including changes to precipitation and temperature patterns.

For years, we have been researching and commenting on the climate change megatrend, providing our views of key related risks as we see them evolve (see for example "[Key 2024 sustainability trends driving the year ahead](#)," Jan. 15, 2024, and "[CreditWeek: What Are The Top Risks To Global Credit Conditions As Of Q2 2024?](#)," April 4, 2024).

**Climate change is a megatrend whose magnitude we would typically consider high.** This is because of:

- **Climate transition risks.** The vast majority of countries have made commitments to limit the global temperature rise to well below 2 degrees Celsius compared with pre-industrial levels by the end of this century, as per the Paris Agreement. We believe these commitments, if they result in measures leading toward net zero carbon emissions, would likely also disrupt companies' business models, notably as economies move away from reliance on fossil fuels; and
- **Physical climate risks.** These will stem from the increasing frequency and severity of climate events over the coming decades from a rise in temperature--even under the most optimistic transition scenario--according to global scientific consensus.

## Step 2: Assess the credit impact transmission channels

Here we examine the ways in which climate transition risks and physical climate risks may feed through to creditworthiness.

**Climate transition risks:** We find that clarity of how these risks are transmitted to creditworthiness and, ultimately, to credit ratings is generally low. This is because many aspects of the transition are still evolving, for instance technology, public policy, and consumer behavior, which can develop at different paces and sometimes in opposite directions.

- **Since the Paris Agreement, average annual global greenhouse gas emissions have continued to increase** (see "[Climate Transition Risk: Historical Greenhouse Gas Emissions Trends For Global Industries](#)," Nov. 22, 2023). This indicates that, for most sectors, ambitions to mitigate climate change have not translated into major regulatory impacts or disrupted operating or financial models. They have therefore not affected the credit factors underlying our ratings, which partly explains why few ratings on corporate entities have changed as a result of this megatrend (see "[Why Climate Related Risks Are Changing So Few Ratings](#)," April 22, 2023).
- **We have taken rating actions in sectors where we saw a clear credit impact transmission channel for climate transition risks.** For instance, in January 2021, we revised our assessment of industry risk for oil and gas companies to moderately high from intermediate, which led to negative rating actions (see "[The Change To The Industry Risk Assessment For Exploration & Production Companies And What It Means For Issuer Ratings](#)," Jan. 25, 2021). At that time, we determined climate transition risks would be transmitted to companies' credit profiles through increased price volatility and weaker profitability.

**Physical climate risks:** We also regard the clarity of transmission of physical climate risks as low, due to the inherent unpredictability of the timing and extent of climate hazards. However, we believe physical risks are increasing as the incidence and severity of climate events rise, and could affect creditworthiness in various ways.

- **The credit impact transmission channels may be direct, for example, through damage to assets, and/or indirect, such as through supply-chain interruptions.** There have, however, been relatively few related rating changes, owing to uncertainty regarding when, how, and to what extent physical climate risks will materialize (see for example "[Risky Business: Companies' Progress On Adapting to Climate Change](#)," April 3, 2024, and "[Model Behavior: How Enhanced Climate Risk Analytics Can Better Serve Financial Market Participants](#)," June 24, 2022).
- **In sectors where we consider the magnitude of physical climate risks to be sufficiently high, we have undertaken research** to deepen our understanding of transmission channels and the potential impact on credit quality. For example, we have explored how worsening climate hazards might affect properties backing U.S. commercial mortgage-backed securities transactions we rate (see "[Damage Limitation: Using Enhanced Physical Climate Risk Analytics In The U.S. CMBS Sector](#)," Feb. 19, 2021). We have also analyzed the extent to which U.S. local governments, sovereigns, and other entities might be affected by rising exposure to physical climate risk (see "[Better Data Can Highlight Climate Exposure: Focus On U.S. Public Finance](#)," Aug. 24, 2020, and "[Lost GDP: Potential Impacts Of Physical Climate Risks](#)," Nov. 27, 2023").

**In assessing the transmission of both transition and physical climate risks to creditworthiness, we are also informed by our ESG Materiality Maps.** S&P Global Ratings' sector ESG Materiality Maps (see <https://www.spglobal.com/ratings>) provide an illustration, at a point in time, of our findings on the relative materiality for a particular sector of certain environmental and social

factors, from both the stakeholder and credit perspectives. These maps provide insights into how climate transition and physical climate risks may become more credit material over time. They also support a comparison of exposure to climate-related risks across sectors, which helps us identify sectors that are likely to be most exposed.

### Step 3: Define plausible scenarios for analytical purposes

Our long-term issuer credit ratings incorporate risks that are sufficiently visible and material. As such, the base-case scenarios underlying our credit ratings are relatively close to so-called “current policies” climate scenarios, as defined by various climate change research bodies. These climate scenarios aim to reflect binding government commitments on climate change, and align to countries' current commitments to reduce global greenhouse gas emissions.

**Where feasible, for the climate change megatrend, we may also consider alternative scenarios and their potential impact on creditworthiness** in the sectors and geographies we consider to be typically most exposed:

- **For climate transition risks**, for example we would consider existing and planned local or regional regulations once we have sufficient visibility on them. We would also consider, among other factors, whether technological innovations are available and their potential pace of deployment. We may also consider national or regional decarbonization pledges or interim decarbonization targets to run scenario analyses at the sector or regional level.
- **For physical climate risks**, we believe exposure will continue until at least the middle of this century, irrespective of today's policy choices, absent efforts to adapt. The IPCC finds that global warming will continue at least until about 2050, given the level of accumulated historical greenhouse gas emissions, before temperatures can stabilize owing to efforts to mitigate these emissions. This situation implies many companies, governments, and other entities will still need to manage vulnerability to climate change. However, since some debt instruments may mature beyond 20 years, we have in some cases run stress tests (see step 4) for certain asset classes under different temperature rise scenarios to explore potential exposures.

### Step 4: Conduct analyses using the scenarios defined in step 3

These analyses facilitate our understanding of the possible impacts of climate change on sectors and geographies typically most exposed to climate risks under the different scenarios.

- **In sectors where greenhouse gas emissions and related climate transition risks remain largely unpriced and have thus not weighed materially on our ratings so far, we typically focus on risks that could arise in the medium and long term.** For instance, we have notably done so when it comes to hard-to-abate industries, which have high dependence on fossil fuels and no simple solutions for reducing emissions, such as cement, airlines, or chemicals. For such sectors, we have analyzed the sources of carbon emissions, the regulatory landscape, industry targets and strategies, as well as technologies that stakeholders consider key to decarbonization. Our conclusion is that interim decarbonization targets (typically by 2030-2035) are technically feasible for some companies in those sectors. However, inconsistent regulation across regions could create uncertainties and diverging effects beyond 2030.



- **For physical climate risks, we may explore the potential change in entities' exposure to climate hazards under different climate scenarios.** This is even though the lock-in effect of historical emissions means many physical risks will continue regardless of today's policy choices. We have applied scenario analysis to various industries, including global major airports (see "[Scenario Analysis Shines A Light On Climate Exposure: Focus On Major Airports](#)," Nov. 5, 2020), U.S. corporate-owned utilities (see "[Keeping The Lights On: U.S. Utilities' Exposure To Physical Climate Risks](#)," Sept. 16, 2021), and U.S. public finance entities (see "[Better Data Can Highlight Climate Exposure: Focus On U.S. Public Finance](#)," Aug. 24, 2020). For global airports, we conclude that unmitigated exposure to physical climate risks could weaken airports' long-term business fundamentals and competitive position, while adaptation actions could lead to more highly leveraged balance sheets without support from regulatory frameworks or stakeholders. We also conclude, for example, that--under the most extreme climate scenario in 2050--airports in Asia-Pacific are the most exposed to heat waves, whereas U.S. airports rank among the most exposed to flooding and sea level rise, with exposure ramping up beyond 2050.

Taken together, the results of these analyses allow for a detailed understanding and assessment of where, how, and the likelihood of when industry patterns may evolve and affect creditworthiness, both in terms of operating models and financial metrics.

### Step 5: Determine, where possible, the potential future rating impact on entities in sectors or geographies identified as highly exposed

In this step, we take a deeper dive into identified sectors or geographies, according to our sector-specific rating methodologies.

**Let's take for example, the cement sector, identified in step 4 as one highly exposed to climate transition risks.** To help determine the possible credit rating impact of transition risks, we can turn to our research focusing on sector decarbonization, among other sources of information.

- We ran sensitivity analyses on European cement companies using carbon prices, notably because they are more likely to be affected by stricter climate regulations than cement companies in other regions (see "[Decarbonizing Cement Part Two: Companies Could See Pressure On Ratings As The EU Firms Up Carbon Rules](#)," Oct. 27, 2022). For instance, recent reforms of the long-standing EU ETS (Emissions Trading System) will potentially tighten the European carbon market and gradually become a greater cost to manage for some industry players.
- From conducting sensitivity analysis on a representative sample of rated entities in the sector, we obtain a clearer view of the different levels of exposure and resulting credit risk, which allows us to determine whether a rating action is appropriate.
- Even if the results do not lead to immediate rating actions, such targeted reviews can help us to better calibrate our approach and to monitor the risks and opportunities of climate transition risks.

**Similarly, regarding physical climate risks in other identified sectors, we can turn to our comprehensive sector reports on the implications of worsening climate hazards.** These include for example reports on the utilities industry (see "[North American Wildfire Risks Could Spark Rating Pressure For Governments And Power Utilities, Absent Planning And Preparation](#)," Nov. 29, 2023) and insurance ("[California's Evolving Insurance Market Has Varying Credit Implications For U.S. Public Finance Entities And U. S. RMBS Securitizations](#)," Aug. 2, 2023).

**The analyses and conclusions in such reports also support and explain our views on why our credit ratings in these exposed sectors have changed or not changed**, and why and how these credit ratings may evolve in the future. In addition, we regularly publish summaries of rating actions that resulted mainly from the impacts of climate change or other factors related to environmental, social, or governance (see for instance "[ESG In Credit Ratings Deep Dive: ESG Factors Drove 13% Of Corporate And Infrastructure Rating Actions Since 2020](#)," published March 13, 2024).

## Looking Ahead: Sharing Insights As Megatrends Evolve

We have shown through the concepts outlined in this paper how we perceive megatrends, factors leading to their credit materiality, and the potential impact they may ultimately have on our ratings, through the relevant credit rating methodologies.

We believe increasing the availability of data and research will enhance market participants' understanding of how megatrends may affect factors relevant to our assessment of creditworthiness and thereby to our credit ratings. There will be further publications on megatrends and credit materiality in the coming months.

## Related Research

- [Risky Business: Companies' Progress On Adapting To Climate Change](#), April 3, 2024
- [ESG In Credit Ratings Deep Dive](#), March 13, 2024
- [Lost GDP: Potential Impacts Of Physical Climate Risks](#), Nov. 27, 2023
- [Climate Transition Risk: Historical Greenhouse Gas Emissions Trends For Global Industries](#), 22 Nov, 2023
- [California's Evolving Insurance Market Has Varying Credit Implications For U.S. Public Finance Entities And U. S. RMBS Securitizations"](#), Aug. 02, 2023
- [Why Climate Risks Are Changing So Few Corporate Ratings](#), April 12, 2023
- [Is Climate Change Another Obstacle To Economic Development?](#), Jan. 16, 2023
- [Environmental, Social, And Governance Principles In Credit Ratings](#), Oct. 10, 2021
- [Model Behavior: How Enhanced Climate Risk Analytics Can Better Serve Financial Market Participants](#), June 24, 2021
- [Better data can highlight climate exposure: Focus on U.S. Public Finance](#), Aug. 24, 2020
- [The Heat is On: How Climate Change Can Impact Sovereign Ratings](#), Nov. 25, 2015

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## Assessing How Megatrends May Influence Credit Ratings

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