

Buildings and Cities: Infrastructure and Construction

Sustainable Development Sector Analysis Framework

May 2018



This is a methodological document aimed at clarifying how Mirova takes into account sustainable development issues in the framework of the environmental, social and governance analysis of each sub-sector of activity.

An affiliate of:

Sectors: Infrastructure,
construction

Despite progress in development, more than one billion people are still not adequately housed, while greenhouse gas emissions from buildings have reached ~20% of global emissions and continue to grow. In a context of population growth and urban growth, public authorities and the private sector must reimagine cities and infrastructure to meet these challenges, whatever the level of development of the countries where they are present. In addition to housing issues, infrastructure is the necessary foundation for the implementation of basic services in sustainable development: mobility, energy, health, education, resource management. Industry players therefore have a key role in enabling and encouraging the emergence of more sustainable cities and regions.



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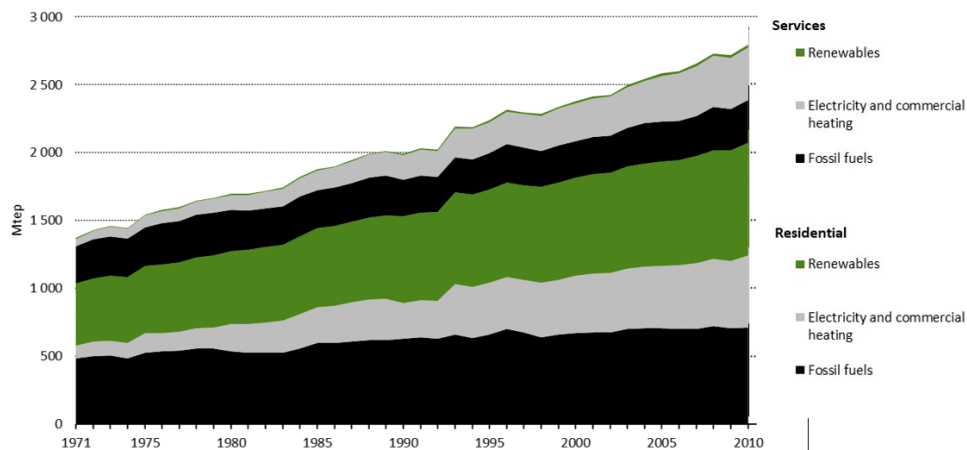


Sustainability Opportunities

Green Buildings

Construction accounts for nearly ~20% of global greenhouse gas emissions. Global greenhouse gas emissions have continued to grow by 1% per year since 2010 (IEA, OECD, 2017).

Figure 1: Total building consumption by energy source

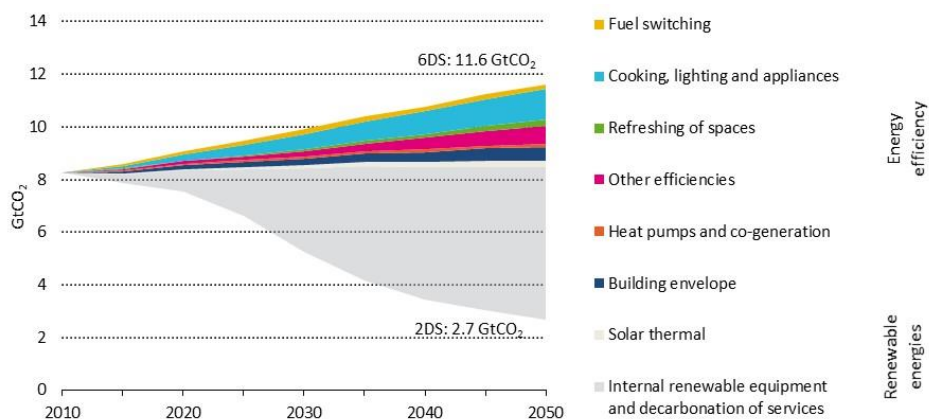


Source: Mirova / (OECD/IEA, 2013)

The residential subsector requires the largest share of energy. The vast majority (90%) of renewable energy in the residential sector comes from the use of traditional biomass energy (wood, charcoal and manure), which remains the main source of energy in non-OECD countries. This traditional biomass energy has impacts on the health of users and causes deforestation that contributes to global warming. Replacing traditional biomass energy, used for cooking and heating, with modern fuels would offer considerable potential for energy savings in the residential subsector while improving the health of users.

To reach a 2°C scenario, CO₂ emissions from the building sector need to be reduced by 75% compared to 2010 levels. (OECD/IEA, 2013).

Figure 2: Greenhouse Gas Emissions by Sector



Source: Mirova / (OECD/IEA, 2013)



In the life cycle approach, 80% of a building's greenhouse gas emissions come from the use phase. These emissions may be direct, via fuel oil or gas consumption on site, or indirect, via electricity consumption.

Achieving these objectives will require several levers.

For the use phase

- The use of less carbon-intensive energies. While most of these reductions will have to be made by electricity producers (see sectoral fact sheet on electricity producers), the construction sector has a role to play in integrating renewable energies into buildings (solar panels, geothermal energy).
- Improving the energy efficiency of buildings. This improvement results either from the design of the building envelope or from the integration of less energy-consuming equipment. Regarding equipment issues, manufacturers' influence is limited to incorporating more efficient products but their role is more important in the case of building envelopes. In particular, manufacturers can influence:
 - The layout, orientation, architecture, shape, interior distribution, and greening of buildings in order to optimize energy consumption;
 - Insulation and sealing that help to stem the flow of air to and from the outside, in order to preserve both the heat and the freshness of the interior space. Effective insulation, the challenges of which lie, on the one hand, in the rupture of the envelope's thermal bridges, via effective insulation of the walls, the roof and the ground, and on the other hand, in the improvement of the thermal resistance of openings, particularly by means of windows and doors. Ventilation, which is also important, with double flow CMVs¹ capable of recovering a large part of the temperature contained in the vitiated air extracted from the dwelling to transmit it to the fresh air entering the dwelling. This process allows warmer air to enter in winter and cooler air in summer.

For the construction phase

- The use of building materials that emit less carbon during construction, in particular wood, which also allows carbon to be stored during the life of the building (Mirova, 2015) and vegetable wool.

Solutions are not to be found only in the design of buildings, but in urban planning on a neighbourhood scale (see section Contributing to the development of sustainable cities).

Finally, while the improvement of energy efficiency in new buildings is already well established, the rehabilitation of existing buildings is a major challenge. As the annual renewal rate of the global real estate portfolio is only 5%, achieving the reduction targets implies a strong focus on renovation. Current renovation rates of 1% to 2% per year are insufficient to reach the 2°C climate scenario (IEA, OECD, 2017).

This urgency in terms of energy efficiency brings financial opportunities for actors in the sector. However, among the major energy consuming sectors, the building sector is the one with the most behind in terms of implementation. There are still many factors limiting the response to the challenges of the ecological transition. First, regulations and incentives remain disparate and focus mainly on new buildings. Moreover, the cost of solutions is often considered too high, as the savings made by reducing energy consumption do not allow financiers to quickly amortize their investments. Finally, the industry is fragmented and not uniformly qualified in these new trades related to energy management in buildings, good building use practices remain insufficiently known and stakeholders lack visibility on energy consumption in real conditions. Regulations are gradually being tightened, which should help actors in the industry to structure themselves better.

¹ Controlled Mechanical Ventilation



We encourage companies to actively work to reduce building energy consumption through increased use of best available technologies and low-carbon energy to power these buildings. At the same time, we encourage producers of building materials to develop products and services dedicated to reducing the environmental footprint of buildings and infrastructure.

KEY INDICATORS

- Energy efficiency strategy for buildings: objectives, CAPEX and revenues related to this strategy
- Portfolio of energy efficiency solutions
- Certifications (e.g.: HQE BREEAM, LEED, etc.)

Promoting Access to Housing

Housing is one of the essential social rights. The right to housing is a fundamental right recognized internationally and constitutionalized by many countries. Yet nearly one in seven people in the world is in a precarious situation, without access to decent housing. UN-Habitat estimates that by 2030, 40% of the world's population will lack access to adequate housing (UN-Habitat, 2015). The factors, exogenous or endogenous, are varied: rapid expansion or, on the contrary, economic crisis, political conflicts, natural disasters, rapid population growth and urbanization, or simply lack of proactive policies.

We encourage companies to offer low-cost solutions to the challenges of social housing development, but also innovations to build decent and affordable housing. It should be noted that actors in the construction industry can also respond to this challenge by limiting the need for rehousing caused by natural disasters, the frequency of which is likely to increase with climate change.

KEY INDICATORS

- Share of turnover generated by products/solutions dedicated to access to housing

Contributing to the Development of Sustainable Cities

Infrastructure can also provide a suitable framework for activities conducive to sustainable development. The United Nations' Sustainable Development Goal 9 (see section Sustainable Development Goals) stipulates that infrastructure provides the basic material means essential to the functioning of a society. Infrastructure is therefore the foundation for a more sustainable model, both environmentally and socially.

The number of urban dwellers should reach 66% of the world population by 2050 (United Nations, 2014), or nearly 6.5 billion people (United Nations, 2017). Faced with this prospect, the cities of tomorrow must meet many challenges in terms of the environment and regional planning, sharing and access to resources, urban pollution and safety.

Sustainable Mobility

Faced with this prospect, it is then necessary to both consolidate existing infrastructures and design new ones, ensuring that the transport system is effective, safe, accessible, affordable and ecological, while contributing to intelligent and efficient management of cities. Meeting these challenges implies the development of several types of technologies and uses, of which infrastructure is the key:



- Development of public transport and access to it for the greatest number;
- Strengthening intermodality, which requires the establishment of specific transport infrastructure to improve connections between the various modes of transport and the development of new mobility channels;
- Installation of electric charging infrastructures to promote the development of electric vehicles to meet the challenges of noise and pollution in cities, and more generally the challenges on oil resources and greenhouse gas emissions;
- Deployment of fibre optic to allow the circulation of shared and connected vehicles that will be able to reduce the negative externalities of individual transport, in particular the risks of road accidents and the loss of time in traffic jams);
- Increase in the number of cycle paths and pedestrian areas.

Seen from this angle, transport infrastructure is no longer one element among others in the shaping of cities but a key for reflection prior to urban design, to ensure the sustainable functioning of a city.

Eco-neighbourhoods and Sustainable Resource Management

Urban planning can also contribute to better use of resources. In terms of energy, buildings can produce local low-carbon energy and enable optimized control of use. Heating networks using renewable energy sources can supply entire neighbourhoods. More generally, thinking about infrastructure on a neighbourhood scale allows a shared use of all resources and the emergence of a circular economy. This approach can also have a positive impact on water and waste management (efficient waste recovery and reclamation systems).

Improving Quality of Life

Construction companies are present in a wide variety of activities: residential, tertiary, public services, etc. Certain types of infrastructure can provide strong social opportunities that contribute to improving quality of life in cities (hospitals, schools, deployment of new information and communication technologies facilitating knowledge and indirect progress in other sectors, etc.).

The concepts of sustainable cities and smart cities intersect and always highlight the essential role of infrastructure. This role can generate new partnerships and financial opportunities to diversify contributions to the sector.

We encourage companies to take into account the environmental and social added value provided by infrastructure projects, in order to become actors that contribute to the design of a more sustainable model.

KEY INDICATORS

- Share of turnover generated by infrastructure related to:
 - The ecological transition of mobility (Mirova, 2018)
 - The rise of eco-neighbourhoods
 - Infrastructure to meet basic social needs



Exposure to Opportunities

Indicators considered :	
<ul style="list-style-type: none"> - Energy efficiency strategy for buildings (objectives, investments, revenues generated, certifications achieved) - Strategy on access to housing or resilient materials - Environmental and/or social added value of the proposed infrastructure 	
High exposure	>50% of revenues from building energy efficiency solutions OR products/solutions that promote access to housing OR resilient buildings OR infrastructure with environmental and/or social benefits
Significant exposure	- Between 10% and 50% of revenues from building energy efficiency solutions OR products/solutions promoting access to housing OR resilient buildings OR infrastructure with environmental and/or social benefits
Low or no exposure	No development strategy for the solutions cited.
Negative exposure	N/A

The analysis of research and development investments dedicated to the stated strategies and of the company's overall strategy can qualitatively temper the analysis based on revenues.



Environmental and Social Risk

Environmental and Social Impact Studies

Infrastructure can have significant environmental and social impacts. These include issues related to:

- Biodiversity, especially for linear infrastructure such as roads and railways;
- The richness of the archaeological and cultural heritage;
- Landscape integration and visual disturbance;
- Activity and local quality of life (conflicts of use, potential noise pollution or air pollution, risks of accidents for passers-by, health and safety of future users),
- Resource consumption and waste generation infrastructure.

These issues must be taken into account from the design stage through environmental impact studies, and also during operation. Neglect of these aspects can have reputational and financial repercussions for companies.

Builders and developers must implement, from the design phase, strategies to map, prevent, reduce and offset the negative impacts of their projects.

KEY INDICATORS

- Mapping of all environmental and societal impacts and related action plan
- Consultation of local stakeholders, follow-up of complaints

Sustainable Management of Construction Sites

Beyond the impacts directly associated with infrastructure, construction/demolition projects generate risks of air, water and soil pollution, CO2 emissions from motorized vehicles, waste, impacts on local biodiversity and inconvenience for inhabitants (noise, safety of neighbouring communities, cessation of local activity). Whether at the design or construction level, labels have emerged to improve visibility on these rules vis-à-vis the various stakeholders. However, no common label for the whole sector has been established. Good practices are therefore not defined in a consensual way and even less shared internationally.

Construction/demolition, as well as the maintenance and operation of infrastructure, sometimes to a lesser extent, expose the people in charge, employees and subcontractors, to health and safety risks: risks of falling, inhalation of dust and fumes, noise, toxicity of certain materials, unsuitable postures, work hardness; there are many challenges to implementing decent working conditions for employees and subcontractors.

This approach must also be extended to construction sites: construction companies must follow defined and transparent rules in order to reduce water and energy consumption inputs (transport of materials and use of construction equipment), protect local fauna and flora, manage the waste generated and reduce pollution.

KEY INDICATORS

- Compliance with labels for site management, transparency regarding the rules and procedures in place, objectives and scope of action (international/case-by-case)
- Health and safety policy and transparency on performance



Human Resources

Construction trades are exposed to labour law risks with frequent pressures on construction lead times and the highest rate of undeclared work in Europe (EUROFOUND, 2008) which implies an even greater risk in countries with weaker governance over social rights. Illegal (forced, undeclared) labour is a significant problem in the sector in view of the multitude of actors: employees, subcontractors, temporary workers. Migration flows further accentuate these risks (ILO, 2016). The latest report by the International Labour Organization also highlights the pressures on the sector in terms of jobs (ILO, 2018).

In addition to these priority issues, companies in the sector must also adapt and train their workforce to new technologies related to green buildings and cities. Strengthening expertise is key to accelerating the development of these solutions in new projects and tenders.

Companies are encouraged to have transparent health and safety policies on objectives, scope and measures deployed to reduce risks. A review of the controversies and practices of each company regarding the working conditions of employees, temporary workers and subcontractors is also included in the criterion of share capital.

KEY INDICATORS

- Working conditions
- Social audits
- Training: dedicated costs, number of people involved, training areas

Business Ethics

The actors in the sector can be highly exposed to the risks of corruption in obtaining new contracts. This exposure is explained by:

- The large size of certain projects and calls for tenders in a highly competitive sector,
- The presence of public actors, often under political pressure, who may incite favouritism offences,
- And finally, the development of new markets in countries where corruption indexes are higher (Transparency International, 2018)

We look for companies to exhibit transparency in their activities and to have mechanisms to ensure compliance with ethical standards and regulation. The frequency and severity of controversies indicates the efficacy of the company's overall approach to ethics and its compliance mechanisms.

KEY INDICATORS

- Antitrust litigation and fines paid
- Significant ethics controversy and company response

Sustainable Development Governance

The integration of the sustainable development strategy into the governance structure appears essential for the industry, which is likely to support the transition towards a sustainable development model for our societies, but is also concerned by strong risks regarding social, societal and governance questions.



We encourage companies to establish governance bodies dedicated to implementing corporate responsibility and mechanisms for integrating the interests of all stakeholders, as well as aligning the interests of executives with the long-term development of the company.

We are also attentive to companies' approaches to value distribution, which should be carried out in an equitable manner among all a company's stakeholders.

KEY INDICATORS

- Quality of the sustainable development approach
- Presence of a director or a board committee specifically in charge of CSR issues
- Integration of extra-financial criteria in the variable remuneration of executives
- Equity in value distribution

Risk Assessment

Criteria	
Positive	<ul style="list-style-type: none"> - A robust policy including strategy, indicators and performance monitoring on the key issues mentioned in the risk review AND - Absence of serious controversy on other key issues
Neutral	All other cases
Risk	<ul style="list-style-type: none"> - Lack of a strategy to control the risks inherent in the design, supply chain, construction and operation of the company's infrastructure OR - Insufficient or inappropriate company response to repeated ethical controversies OR - Reaction considered insufficient or inappropriate by the company to a controversy over the respect of labour law on its construction sites/quarries/production sites OR - Reaction deemed insufficient or inappropriate by the company to repeated controversies on the health and safety of employees, subcontractors, temporary workers OR - Reaction considered insufficient or inappropriate of the company to controversies over its relations with people living in the vicinity of its infrastructure or users.



Conclusion

Given the increased demand for housing and infrastructure that it generates, demographic and economic expansion will only be compatible with reaching a 2°C scenario if the carbon impact linked to the construction sector is drastically reduced. From the design to the end of life of buildings and structures, there are many solutions. On the other hand, access to decent housing remains a major challenge of the 21st century, which some players in the sector are helping to overcome by offering dedicated solutions (low-cost construction). Finally, infrastructure is the foundation for new models and has a key role to play in developing sustainable solutions.

Companies are also assessed on their management of the risks inherent in their activities, i.e. according to sub-sectors: environmental impacts from design to implementation, health and safety risks and working conditions on construction sites and production sites, societal nuisances of construction. For so-called "business as usual" activities, i.e. activities that are not positioned on key predefined opportunities, good management of these risks, which guarantees the sustainability of the activity, may represent a favourable differentiating criterion.

Conversely, a company presenting opportunities in its portfolio of activities, but also defects in its material risk management, may be excluded from our investments.

The consideration of all these issues makes it possible to improve understanding of the activities and practices of companies in the sector and therefore guide investment decisions.



Our Approach to sustainability assessment

Acting as a responsible investor requires interpreting the economic world within its social and environmental context. This approach calls for understanding the interactions between different private-public players, small-medium-large companies, developed and developing economies to ensure that each player's growth is consistent with the balance of the rest of the system. It is a long-term approach that guarantees that today's choices will not lead to negative consequences for future generations. Understanding these complex relationships demands:

- Clear understanding of sustainable development issues facing our societies,
- Assessing the possible interactions between the assets of our investment strategies and these sustainability issues.

The SDGs as a Guide

Following the Millennium Development Goals created in 2000, the United Nations set out a new framework for sustainable development in 2015. It contains 17 Sustainable Development Goals (SDGs), broken down into 169 specific targets designed to address the main social and environmental issues between 2015 and 2030. In addition to having been adopted by all members of the United Nations, the SDGs offer several advantages.

First, they establish a comprehensive framework concerning environmental and social issues, applicable to all economies regardless of their level of development. Thus, while some issues such as ending hunger or ensuring access to water for all are often more relevant for low- and middle-income countries, other objectives such as fighting climate change or making cities safe, resilient and sustainable, are applicable at all levels of development.

Moreover, the SDGs can be considered as a frame of reference for sustainable development issues for a variety of actors, from governments to companies and investors. The private sphere is increasingly considering environmental and social issues, illustrating new forms of governance where subjects of general interest are no longer solely the prerogative of the public sphere. Considering the SDGs can help companies to think on how they create environmental, economic, and social value.

Finally, the SDGs help investors to question the long-term resilience of their assets and portfolios to the ongoing transformations. Then, investors can go even further by looking at their exposure to new solutions and economic models that will respond to long-term economic transformations. For example, the targets associated with the SDGs to significantly increase the share of renewable energy and to double energy efficiency by 2030 imply a profound transformation within the energy sector.

We consider the SDGs squarely in line with our mission. As a result, in 2016, Mirova decided to use this framework to define its responsible investment approach.



Figure 3: The 17 Sustainable Development Goals

	End poverty in all its forms everywhere		Reduce inequalities within and among countries
	End hunger, achieve food security and improved nutrition and promote sustainable agriculture		Make cities and human settlements inclusive, safe, resilient and sustainable
	Ensure healthy lives and promote well-being for all at all ages		Ensure sustainable consumption and production patterns
	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all		Take urgent measures to combat climate change and its impacts
	Achieve gender equality and empower all women and girls		Conserve and sustainably use the oceans, seas and marine resources for sustainable development
	Ensure availability and sustainable management of water and sanitation for all		Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
	Ensure access to affordable, reliable, sustainable and modern energy for all		Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all		Strengthen the means of implementation and revitalize the global partnership for sustainable development
	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation		

Source: United Nations



Assessing Environmental and Social Quality by the SDGs

We believe that the SDGs will transform the economy as we know it. Acting as a responsible investor starts with taking a broader view of the way investors think about the environmental and social profile of the assets they finance. These interactions can be grouped into two categories:

- **Materiality:** how the current transitions are likely to affect the economic models of the assets financed either positively or negatively.
- **Impact:** how investors can play a role in the emergence of a more sustainable economy



We believe that these two approaches are closely linked. Our evaluation methodology thus seeks to capture the extent to which each asset contributes to the SDGs. From our perspective, this approach provides a relevant vision on both the "Materiality" and "Impact" aspects.

A Five-level Qualitative Analysis

Mirova has based its environmental and social evaluation method on four principles:

A RISK/OPPORTUNITY APPROACH

Achieving the SDGs requires taking two different dimensions into account that often go together.

- **Capturing opportunities:** when companies center their strategies on innovative business models and technologies focused on technological and societal transformation, they can often capture opportunities related to the SDGs.
- **Managing risks:** by proactively managing risks related to these transitions, companies can reduce and re-internalize their social and environmental externalities, which often takes the form of general management of sustainability issues.

This analysis structure gives equal importance to opportunities and risks. It is the first prism through which we analyze sustainable development issues.

A LIFE-CYCLE VISION

To identify the issues that could impact an asset, the analysis of environmental and social issues must consider the entire life cycle of products and services, from raw material extraction to end-of-life phase.

TARGETED AND DIFFERENTIATED ISSUES

Our risk/opportunity analysis focuses on the elements most likely to have a real impact on the assets studied and on society in general. Additionally, the issues that economic players face

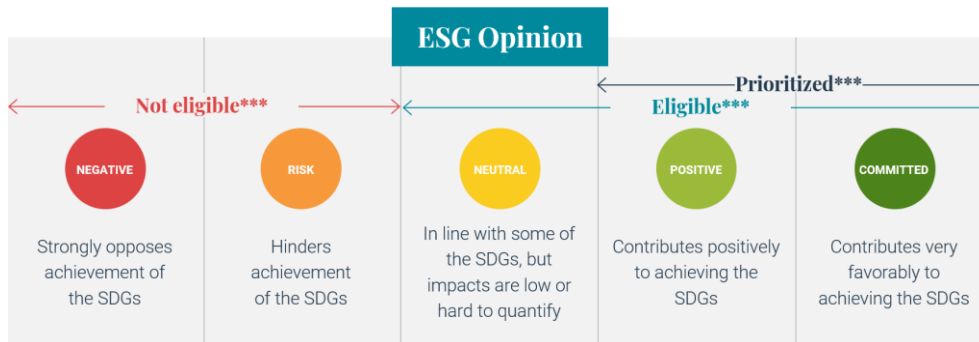


are very different depending on the sector, and can even vary within the same sector². For example, it is important for us to focus on work conditions for suppliers in the textile industry, while for automobile manufacturers, the focus will be more on energy consumption during product use.

So, our analysis focuses on a limited number of issues adapted to the specificities of each asset.

A QUALITATIVE RATING SCALE

Our analyses are summarized through an overall qualitative opinion on five levels. This opinion assesses to what extent an asset contributes to the SDGs.



***3

This rating scale is based on the SDGs and their achievement. As a result, opinions are not assigned based on a distribution set in advance: we are not grading on a curve overall or by sector. Mirova does not exclude any industry on principle, and carries out a thorough analysis of the environmental and social impacts of any asset. For some sectors, this analysis may lead to the exclusion of all or some of its actors. For example, companies involved in fossil fuel extraction are considered "Risk" at best, while renewable energy companies are generally well rated.

An indicative grid provides some overall guidelines regarding the links between opportunities, risks and the overall sustainability opinion.

Sustainability Risks Review	Positive	Risk	Positive	Positive / Committed	Committed
	Neutral	Negative / Risk	Neutral	Neutral / Positive	Positive / Committed
Risk	Negative	Negative / Risk	Risk	Risk	
	Negative	Low or no	Significant	High	
	Sustainability Opportunities Exposure				

² For every sector, defining key issues is the subject of a specific study. This document is available on Mirova *website*. <https://www.mirova.com/fr/recherche/comprendre#vision>

³ *** For Mirova's investments



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