Energy: Electric and Gas Utilities

Sustainable Development Sector Analysis Framework

July 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: NATIXIS INVESTMENT MANAGERS

Sectors: Production, generation, transmission, distribution, sales, or trade of electricity and/or gas

Electric and gas utilities face a complex energy landscape currently characterized by structural changes and impending growth. Greenhouse gas regulation, decarbonization objectives, changes in commodity prices, and shifting public perceptions have put the sector's traditional business model at risk despite growing global energy and electricity demand. Utilities must now find a way to continue to reliably produce and distribute energy while simultaneously lowering their carbon footprint.

So, decreasing the use of fossil fuels and increasing the share of renewables in the generation mix – all while managing worker health and safety, environmental impacts, nuclear security, and more - are the major levers for action within a sector seeking to ensure its place in a volatile energy environment.

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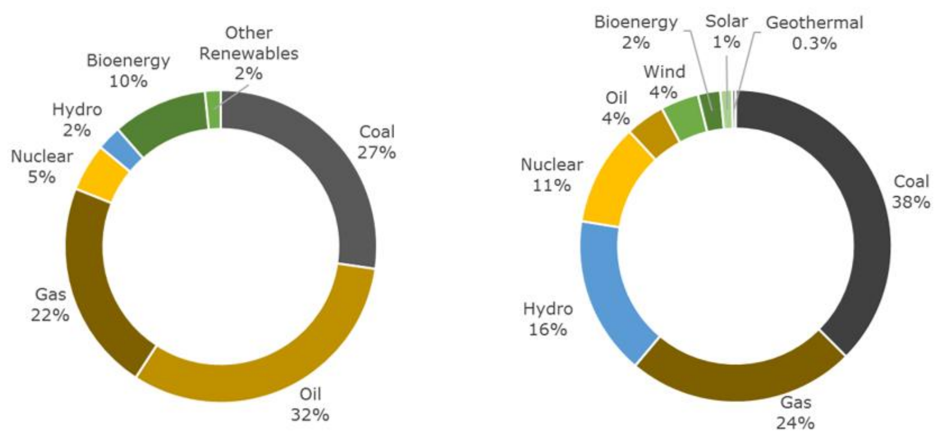
Renewable Energy

Avoiding the potentially catastrophic physical, social, environmental, and economic effects of unchecked climate change requires limiting global average temperature rise to 1.5-2°C above pre-industrial levels. This means that carbon dioxide emissions must be reduced to the maximum extent possible over the shortest feasible timeframe.

In the context of utilities, it is important to keep in mind the difference between energy and electricity mixes. An energy mix includes all energy use, including the fuel burned by cars, used for heating and cooling, used directly in industry, and used indirectly as electricity. The electricity mix is a part of the energy mix and represents just the fuels used to generate electricity. For example, the large share of oil in the global energy mix below represents the high oil consumption of the transportation sector. Then, its relative absence in the electricity mix reflects oil's lesser role in power generation.

Figure 1: Global Energy Mix, 2016 — Global Electricity Mix, 2016



Hydro, renewables, nuclear, and a large part of coal's share in the energy mix are largely dedicated to electricity. The remaining coal is used directly in industrial processes (i.e. steel, concrete). Bioenergy is renewable includes biofuels, often used with or instead of oil in the transportation sector; biomass, often used to replace coal in electricity generation; and biogas, which can substitute gas. All come from renewable sources. Natural gas is used for both electricity and directly consumed in buildings for heating; its share in transportation is currently small.

Source: (IEA, 2017)

Utilities focused on electricity produce, transmit, and deliver electricity produced via their electricity mix to their customer, while gas utilities transport gas from its producer to the industrial, commercial, and residential sectors.

So, while it is difficult to substitute fossil fuels in the industrial processes that rely on them directly (i.e. coal in steel/concrete or gas in chemicals) or to replace gas for utilities that operate gas transmission and distribution infrastructure, electric utilities do have several viable options to reduce the share of fossil fuels in their electricity mix without impeding reliable power generation. The main alternatives are renewables: wind, solar, hydropower, geothermal, and bioenergy. Two other replacement options exist, though neither are considered renewable: nuclear power, which has climate impacts as positive as renewables but is associated with substantial social risk; and natural gas, which is not nearly as climate-friendly as renewables or nuclear, but can halve the emissions per unit of power generated when it replaces coal.

So, we believe the most important metric for assessing opportunities for utility companies is the carbon intensities of the fuels in their energy mix, i.e. how much carbon is emitted per kilowatt-hour produced.

Table 1: Carbon Intensities of Fuels

Fuel	Generation Carbon Intensity (gCO_2/kWh) (50th percentile)	Lifecycle Carbon Intensity (gCO_2/kWh) (25th-75th percentile)
Wind	0	8-20
Solar PV	0	29-80
Hydropower	0	3-85
Geothermal	0	20-57
Biomass	0	37-360
Nuclear	0	8-45
Gas	400	422-548
Coal	945	877-1130

Source: http://www.ipcc-wg3.de/report/IPCC_SRREN_Annex_II.pdf

Wind Power

Wind power comes in two forms: turbines installed on land (onshore) or on platforms at sea (offshore). Both lead to very few greenhouse gas emissions, totaling zero during operation and relatively few from the supply chain.

Furthermore, the economics of wind power have improved substantially in recent years, mostly because of scale effects in the industry and fierce competition between manufacturers, encouraged by the emerging preeminence of wind capacity auctions. In regions with reasonably good wind resource, onshore wind is now competitive with fossil fuels. Offshore wind is a mature market in Europe, and though its average costs remain higher than onshore, installations are expected to increase globally as learning effects and infrastructure develop.

In our view, wind power represents substantial climate benefit with low associated environmental and social risks; it is a good choice for utilities looking to decarbonize their energy mix.

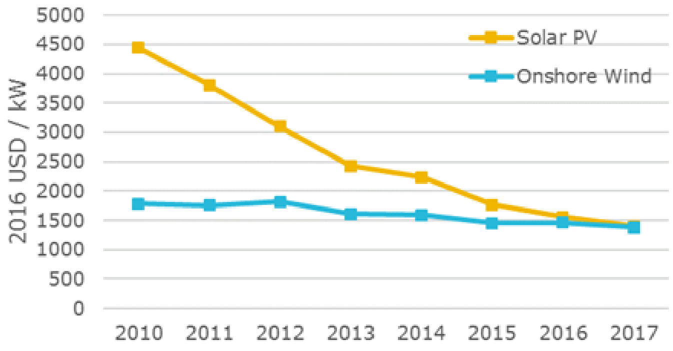
Solar Power

Solar power uses the semiconductor properties of silicon to generate electricity from sunlight. It is the newest of all the energy systems, and unique in its suitability for decentralized power generation and the ongoing price reduction potential due to learning effects.

Solar emits zero carbon during electricity generation, with the supply chain and maintenance contributing relatively few emissions also. Efficiencies of the panels are improving with time, further contributing to improving economics. Solar power is expected to experience enormous growth in the coming years, not only because it can be put nearly anywhere, but also because its decreasing prices imply competitivity with fossil fuels in the near future.

Because solar power’s high climate benefit and minimal impacts throughout its lifecycle, it is also considered to constitute high investment opportunity.

Figure 2: Total installed costs of onshore wind and solar PV projects (global weighted average, 2010-2017)



Note that the costs of wind and solar power have yet to fully take into account the intermittency of these energy systems, which may require adapting the grid and/or substantial investments in storage to manage.

Source: Mirova / (IRENA Renewable Cost Database, 2018)

Hydropower and Geothermal

Hydro and geothermal power both emit near-zero carbon over their lifecycles and are very location-dependent: unlike the wind and the sun, neither geothermal resource nor suitable rivers are present everywhere. Since these technologies are very mature, countries with hydro and geothermal resource have largely implemented these energy systems in most available sites.

As a result, hydro and geothermal exhibit relatively low growth potential in Europe, China, and the United States. In developing countries, some potential remains for large hydropower plants, which provide large amounts low-carbon energy, but they tend to be met with opposition. Large dams can displace local populations, disrupt ecosystems, and lead to negative climate impact in tropical regions as plants decompose and emit methane, a potent greenhouse gas.

Because of their positive carbon impacts – in line with those of wind and solar - hydro and geothermal power are considered sources of opportunity. Even so, the risk management practices of new hydro projects must be assessed case-by-case to verify the absence of negative ecosystem or human rights impacts.

Biomass

Bioenergy refers to plant-based matter used as an energy source. Biomass, usually agricultural waste or wood pellets from forestry by-products, can be used to replace coal. Biogas produced from sewage, landfills, or other sources of waste can be used to replace natural gas in power generation. Bioenergy has the advantage of being readily substitutable for fossil fuels with only slight changes needed to the infrastructure.

Biofuels are considered carbon-neutral because trees/crops store carbon throughout their life, which is then liberated by burning or decomposition. This means that biomass does emit carbon when it is used to produce power, but the carbon had been absorbed from the air during the plant's lifetime. It is thus crucial the the sustainability of the biomass supplies is assured; agricultural and forestry waste is ideal since it does not imply burning wood that could otherwise be used to continue to stock carbon, and bioenergy-dedicated crops should not displace food crops.

In general, adopting bioenergy as a fuel source is considered an opportunity for utilities when reasonable assurance of sustainable sourcing is in place, and especially so when it replaces coal.

FOCUS: GAS

When burned, natural gas emits about half as much carbon as coal, but still substantially more than renewables. It is often considered a “bridge” fuel for the energy transition as it leads to positive climate benefit when it replaces coal.

Natural gas is mostly made up of methane, which is a highly potent greenhouse gas (32 times more potent than CO2 over a 100-year period). As a result, relatively small methane leaks throughout the supply chain can call into question gas’ true climate benefit; at a 3% leakage rate, the two fuels are considered to have similar carbon impacts. And while the official leakage figures released by companies and governments are nearly always far below the 3% threshold, studies have suggested that they are systematically underestimated (Alvarez, 2018). Avoiding lock-in to fossil fuels is also important, developing new natural gas capacity does not necessarily lead to positive long-term climate impacts either if it impedes the development of renewables.

Our view is therefore that gas needs to be assessed in context. It is not considered a de-facto source of opportunity, but we recognize the role it can play – when methane escape rates are well managed, an issue particularly difficult to manage in the context of shale gas – in decarbonizing countries with substantial coal generation. In countries that already have low-carbon energy mixes, we usually do not consider natural gas a suitable way to address the Sustainable Development Goals.

FOCUS: NUCLEAR

Looking exclusively at nuclear’s carbon impacts, it seems an excellent choice for decarbonization. It emits zero carbon and zero pollutants during electricity generation, it produces large, stable amounts of power, and its supply chain is not emissive. However, nuclear power leads to substantial long-term social risks, namely long-term waste storage and the potentially wide reach of accidents. Managing these risks is highly dependent on local regulator quality, company practices, quality control throughout the supply chain, and physical plant location; many factors that vary substantially from place to place and can thus be difficult to assess externally.

Following the Fukushima accident in 2011, the economics of nuclear have become more complicated in Europe and the U.S. due to tightening regulation, new reactor types, decreased public support, and greater competition from renewables and natural gas. As a result, nuclear’s position as a low-cost energy source is no longer assured; growth has stagnated in these markets. Lower-cost nuclear builds have been achieved in China, which anticipates high growth in its nuclear capacity in the mid-term, though concerns still loom over safety.

While we acknowledge the climate benefits of nuclear power, the social and economic issues surrounding it remain consequential. Companies are not disqualified from investment if a share of their mix is nuclear-derived, but strong risk management plans and measures should be in place[1].

[1] For more information about Mirova’s position on nuclear power, please see: https://www.mirova.com/sites/default/files/2020-08/2016NuclearsUnclearFuture.pdf

Finally, it will be necessary to adapt the existing transmission and distribution infrastructure so that it is more flexible and capable of handling intermittent and decentralized power sources like wind and solar. Companies which invest substantially in smart grids, whether via demand management solutions, storage, or specialized cabling can also be exposed to sustainability opportunities.

In the context of the global transition to a low-carbon energy mix, utilities must decrease their emissions and reduce their dependence on fossil fuels. We believe that renewables like wind, solar, hydro, geothermal, and biomass are the best choices for reducing this dependence.

Utilities which endeavor to reduce their carbon intensity by producing energy from renewable sources (wind, solar, hydropower, geothermal, and biomass) offer investment opportunity, particularly in highly fossil-fuel dependent regions.

Development of grid solutions to facilitate the large-scale implementation of these energy sources can also be considered opportunity.

KEY INDICATORS

- Carbon intensity of power generation
- Revenues generated from transmission / distribution of renewable energy
- CapEx / part of the R&D budget dedicated to renewables / grid solutions

Access to Energy

Secure access to energy and electricity benefits development by providing lighting, heating, cooking, and more, but 1.1 billion people across the globe do not currently have access to electricity. Increasing generation capacity and transmission and distribution infrastructure could therefore have substantial, positive impacts on development, especially in rural areas in developing Asia and sub-Saharan Africa (IEA, 2017). These markets also represent a large, yet-untapped group of consumers for utilities companies.

It should be noted that while expanding access to energy is an opportunity regardless, capacity development should be considered in an environmental context; efforts should be made to reduce path-dependency on fossil fuels, especially coal.

We look for companies strongly positioned to provide widespread access to energy, especially in underserved markets

KEY INDICATORS

- CapEx/part of the R&D budget dedicated to expanding access to energy

Exposure to Opportunities

	Indicators considered: Carbon intensity of power generation (relative to region, world, and 2°C scenario) + Percent of revenues generated from generation, distribution, and sales of (i) renewable energy, (ii) gas or gas-based electricity in coal-dominated areas with high average carbon intensity or (iii) nuclear power. + CapEx and/or part of the R&D budget dedicated to (i) the development of solar and wind capacity, (ii) the development of gas and nuclear capacity or infrastructure additions, or (iii) the development of solutions for expanding access to energy	
High exposure	Generation mix is dominated by renewables including solar, wind, hydropower, and potentially biomass (carbon intensity is < 100g CO_2/kWh) OR The majority of activities are in facilitating connection of renewable power sources / smart grid development	CapEx, revenues, and R&D-based indicators are secondary, allowing for greater qualitative nuance in the ratings.
Significant exposure	Carbon intensity of generation is less than 300g CO_2/kWh OR Major change in business model, from fossil fuels-focused to low carbon	
Low or no exposure	Large majority of activities in gas / transmission / distribution / nuclear OR Generation mix is diversified (carbon intensity is ~350-390g CO_2/kWh)	
Negative exposure	Generation mix is dominated by coal (carbon intensity is >> 390g CO_2 / kWh)	

Environmental and Social Risk

Impacts of Power Systems

Utilities' environmental and social risks vary by energy source, both in breadth and in width. Utilities that rely on fossil fuels, for example, are particularly exposed to risks associated with regulating greenhouse gas emissions and air pollution, and those involved in gas transmission or which have vertically integrated to include extraction of fossil fuels must further monitor the environmental impacts of these activities, as well as those arising from generation and distribution. Gas extraction and transmission may lead to methane emissions in quantities significant enough to negate any potential for positive impact. Effects on the aquatic table due to fracking, oil spills, and degradation of land associated with coal mining are additional examples. The high stakes nature of climate change and land degradation associated with these activities require particularly stringent environmental and social management systems.

Utilities that operate large hydropower plants must act proactively to avoid negative biodiversity impacts and human rights violations (i.e. displacement of populations and destruction of livelihoods). Those using bioenergy must pay attention to the sustainability of their biomass supply chain to ensure that their source material is derived from waste and does not replace food crops. Wind and solar operators face must ensure limited biodiversity effects, minimal noise pollution, and sufficient consultation of local populations.

Energy efficiency is another important way utilities can mitigate their environmental impacts; by improving the energy efficiency of thermal generation and providing incentives to promote efficiency by consumers, companies can reduce their carbon footprint substantially.

Effective monitoring and management of environmental and social impacts leads to a more sustainable business model. Conversely, inadequate management can lead to steep costs from regulatory action or litigation.

First, utilities should reduce their environmental footprint by acknowledging climate change, creating GHG and pollutant inventories, and setting targets to reduce these emissions. Next, they should move toward a more sustainable generation mix, particularly through adding renewables and improving efficiency.

Environmental impacts can also be managed by protecting biodiversity in hydropower projects and transmission infrastructure. Risk can be further mitigated by preventing leakage from gas transmission and distribution systems through stringent compliance to regulations and monitoring procedures.

KEY INDICATORS

- Existence of company policies with focus on environmental management, efficiency, and compliance, including performance indicators and quantified objectives (energy, GHG emissions, water, etc.)
- Evolution of environmental impacts over previous years (GHG / other pollutant emissions, water use, etc.)

Worker Health and Safety

The utilities sector entails a slew of dangerous activities, and the health and safety of all workers, employees and contractors, is paramount.

The majority of accidents take place by electrocution during installation of electrical components, construction, and maintenance of power lines. Utilities which vertically integrate to include mining in their value chain must also pay attention to latent risks of fire, asphyxiation, and mine collapse.

We primarily look for health and safety policies that cover the entire workforce.

In addition, we seek a company culture of safety comprised of procedures, directives, concrete actions, plus a clear indication of increasing health and safety standards.

KEY INDICATORS

- Formal health and safety policy, performance indicators and quantified objectives
- Significant performance improvement over the previous years

Nuclear Security

Though nuclear power is a low-carbon energy source, it presents a unique set of social risks. The principal areas of concern are worker safety, plant security, and waste disposal.

Exposure to radioactive materials, like those resulting from nuclear power generation, can have severe health effects including cancer and genetic mutations. Contamination of water resources would also have wide-reaching effects. Chemical and radiation risks to workers must be managed on a daily basis, as well as for inhabitants of the surrounding area in case of an accident.

Spent fuel could also be repurposed for use as weapons. As a result, companies operating nuclear plants are responsible for ensuring that fissile materials remain secured and well-contained, away from workers, the general populace, security threats, and the environment.

In addition, the question of waste disposal remains problematic. Planning for long-term storage typically calls for creation of repositories in geologically stable areas and requires joint efforts between companies and governments. Short-term storage methods are often onsite and relatively unsecured. Finally, decommissioning also necessitates large funds to cover decontamination and dismantling costs, typically mandated by regulation and consequentially set aside by plant owners and operators. These can be sizeable liabilities which stress balance sheets, but are essential in order to assure that the plant will leave minimal traces after it ceases to produce power.

These risks underscore the necessity of strong regulatory frameworks in areas where nuclear power plants are present. Plants operating in countries without strong regulatory bodies face inherent social and environmental risks tied to the lack of oversight by national safety agencies.

We look for safety measures specific to the risks associated with nuclear power: strict monitoring of safety compliance, potential security weaknesses and demonstrated attention to the problem of nuclear waste.

If flaws are identified in the reactor's construction or operation, we hope to see companies actively investigate and rectify the issues.

We also prefer to see a strong regulatory framework mandating clear risk management protocols.

KEY INDICATORS

- Policies for nuclear risk management and compliance, including quantified objectives
- Continuous improvement in social metrics (safety and security)
- Located in regions with strong regulatory bodies and oversight
- Budget related to back-end of fuel cycle, including R&D and decommissioning provisions

Human Resources

The existing business model of utilities is being challenged by decentralized generation and renewables. The business model of utilities is based on demand and the marginal cost of generation; since renewables have minimal operating costs and are thus prioritized on the grid, fossil-fired plants' margins are squeezed. The subsequent low electricity prices can strain the sector's profitability, which is already sensitive to numerous macroeconomic conditions, including commodity prices, and regulation. As a result, restructuring and/or layoffs are common.

German utilities, for instance, have been under regulatory pressure to reduce or eliminate their coal and nuclear operations in order to comply with the country's energy transition goals. Meanwhile, dropping electricity prices due to the subsidization and implementation of renewables have led revenues for fossil-focused utilities to fall. Restructuring has eliminated thousands of jobs as a result.

Large-scale layoffs can be problematic as social stability is a prerequisite for long-term growth. When restructuring and job cuts do take place, however, providing assistance in finding alternative employment, providing reasonable severance pay, and consulting with unions/employees all represent socially responsible restructuring practices.

We encourage companies to restructure responsibly if it is not possible to anticipate market changes and adapt the skills of the existing workforce.

KEY INDICATORS

- Policies relating to responsible restructuring
- Mechanisms to attract and retain workers

Business Ethics

The nature of generation, transmission, and distribution infrastructures for both electricity and gas means that utilities often have monopolistic market positions. These companies must resist the temptation to entrench themselves in market manipulation or unfair business practices. Investors and communities must remain vigilant in holding utilities accountable.

Anti-trust and anti-market manipulation laws attempt to limit such behavior, but these vary from country to country. The responsibility therefore falls on each company to ensure its practices are ethical and compliant with local laws and regulations. This includes transparency regarding generation mix, strategy, price policy and rate structure, and ensuring good practices in client relations. Any regulatory changes must be reflected in utilities' governance, while the companies' governance must also fall under the regulators' purview.

Market manipulation, fraud, profiteering, and antitrust activities can lead to costs and liabilities from regulatory enforcement, criminal or civil sanctions, ongoing compliance costs or recurring fees, negative effects on the company's reputation and intangible assets, or higher costs of capital due to higher risk premiums.

Generally, a high level of transparency tends to indicate good management of ethics risks. Companies should go beyond regulatory requirements in product and service quality while implementing risk management processes and monitoring marketing practices.

How frequently a company is involved in a controversy, as well as its ability to respond responsibly, are part of our analysis.

KEY INDICATORS

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

Sustainable Development Governance

Corporate governance practices can have an impact on a company's performance; more democratic and stakeholder-focused practices ensure that corporate strategy is aligned with the best interests of its shareholders while taking into account environmental and social concerns.

Creating dedicated committees for corporate social responsibility, facilitating shareholder participation, divulging remuneration schemes, and disclosing fiscal strategy are some of the ways utilities can demonstrate their commitment to sustainable development.

Analysis of responsible governance practices should include: a review of board structure, namely the separation between supervision and management; independent audit, compensation, and sustainability committees; a review of shareholder democracy, including voting rights; and ability to introduce resolutions; and a review of executive remuneration, specifically whether compensation schemes are transparent, and ESG objectives are integrated.

KEY INDICATORS

- Fiscal strategy and tax rate
- Governance of corporate social responsibility

Risk Assessment

	Criteria
Positive	Does not meet "risk" criteria AND - Comprehensive policy for reduction of environmental impacts: formalization of environmental risk assessment and management procedures, fuel-dependence and efficiency of operating plants, verified inventories and closely-followed environmental performance indicators AND - Satisfactory management of worker health and safety AND - Satisfactory management of nuclear risks (if applicable) AND - Comprehensive code of ethics plus adequate response to ethical controversies
Neutral	All other cases
Risk	- Repeated ethical controversies with inadequate or insufficient company response OR - Activities with high health/safety risks for workers, and lack of health/safety management (indicators related to health/safety performance) OR - Activities with significant safety or security risk, specifically applied to nuclear power, with lack of adequate management / regulatory framework OR - Activities with significant direct environmental impact and absence of advanced management (following environmental indicators)

Conclusion

Electric utilities are at the forefront of the environmental transition: they can aid in achieving a quick decarbonization by substituting fossil fuels in their generation mix with renewables. Facilitating access to energy, while not sufficiently addressed by most utilities today, could be another source of opportunity. Companies strongly positioned in these activities are considered positively within the scope of our responsible investment policy.

Utilities are also evaluated based on the risks inherent to their activities, including reduction of environmental impacts, worker health and safety, security of nuclear plants, and business ethics. For companies not positioned to take advantage of the aforementioned opportunities, exceptionally strong risk management indicates a sustainable business model, which is also favorable in our view.

On the contrary, a company can be excluded from investment if its risk management is deemed inadequate, especially if engagement fails to rectify deficiencies. In cases where transparency is not sufficient to obtain a nuanced understanding of the company's strategy and practices, we open dialogue.

As the energy sector evolves, utilities must evolve too. They are especially key players in the shift to a lower carbon energy system, with a pivotal role to play in achieving the goals of the Paris Agreement. We, as investors, seek to support this transition by preferentially allocating capital to the most actively participating utilities.

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 SGDs 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

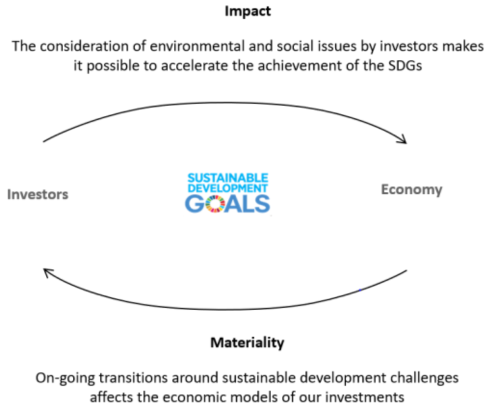
End poverty in all its forms everywhere	Reduce inequalities within and among countries
End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Make cities and human settlements inclusive, safe, resilient and sustainable
Ensure healthy lives and promote well-being 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 territorial 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.

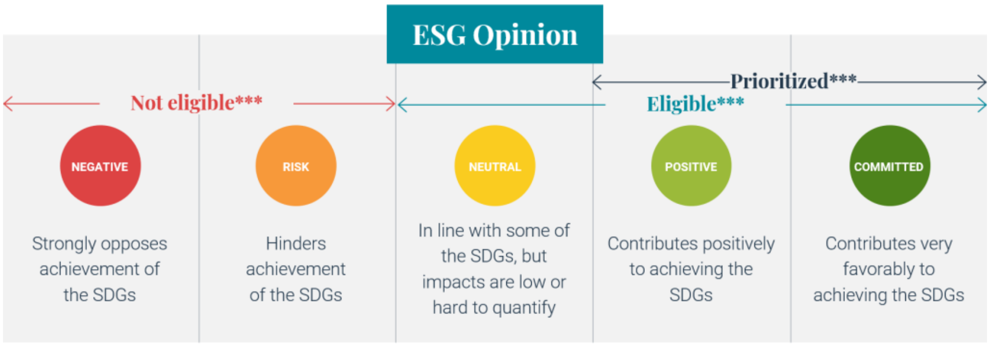
TARGETED AND DIFFERENTIATED ISSUES

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 sector[2]. 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.



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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		Negative	Low or no	Significant	High
	Positive	Risk	Positive	Positive / Committed	Committed
	Neutral	Negative / Risk	Neutral	Neutral / Positive	Positive / Committed
	Risk	Negative	Negative / Risk	Risk	Risk

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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