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NATIXIS INVESTMENT MANAGERS

Growth capital to support the energy transition

Anne Boulet
Investment Manager
Impact Private Equity

Sarah Maillard
Head of Sustainability Research
Private Assets

Kenza Lahbabi
ESG Analyst
Impact Private Equity

When energy has to lead its own revolution...

- **1.** Between 1900 and 2021, energy consumption grew by a factor of 14.5.
- **2.** The energy sector is responsible for 73% of global greenhouse gas emissions.
- **3.** Net-zero emissions by 2050 requires massive investments in renewable energies, but also in their integration with existing infrastructure.
- **4.** “Fit for 55”, “RepowerEU”, and the “Inflation Reduction Act” all contribute to a conducive political and regulatory environment.
- **5.** Electricity and heat generation from renewable resources, energy efficiency, alternative fuels: technical solutions do exist today and are in need of a boost to accelerate.

“The global energy system is broken, bringing us closer to climate catastrophe.”

These were the words that United Nations Secretary-General Antonio Guterres used to urge the world to end fossil fuel pollution and accelerate the renewable energy transition, “before we incinerate our only home.”[1]

Alone responsible for 73% of carbon dioxide emissions[2], the energy sector is at the forefront of a change of model. But while the trajectory has been mapped out, many challenges still lie ahead, and there are huge needs for financing.

In these circumstances, Mirova’s Environmental Impact Private Equity team seeks to accelerate the deployment of solutions and technologies that will contribute to meeting the net zero trajectory to 2050.

DECARBONISING OUR ENERGY MODEL

Fossil fuels, the main drivers of climate change

All-time high temperatures, increasingly early droughts, devastating forest fires and hurricanes, dramatic floods, mountain landslides... from California to Pakistan and from Europe to the Pacific and the polar regions, **the effects of climate change are there for all to see - and feel.**

The main cause of global warming has long been known: **the saturation of greenhouse gases - primarily CO_2 - in the atmosphere.**

And whether used in the form of heat, electricity or transportation fuel, it is energy, dominated by fossil fuels, that today accounts for 73% of these man-made emissions[2].

Beyond the carbon dioxide emissions attributable to the combustion of these fossil fuels, their extraction, processing and transport **present environmental risks** and are a major source of pollution for land, water and airborne ecosystems.

1. Le Monde (May 2022)
2. The World Resource Institute (2020), “Climate Watch”

Growing population, growing energy needs

The more inhabitants there are on the planet, the more energy is needed to meet their essential needs: eating, heating, working, and getting around.

Between 1900 and 2022, the world's population increased from about 1.6 billion to 8 billion[3] (x5), and energy consumption increased by a factor of 14.5 over the same period[4]. Biomass, historically the main source of energy, gradually gave way to coal and then to oil and gas. In 2020, coal, oil and gas together still accounted for almost 85% of the primary energy consumed in the world[5].

Demographic growth and the gradual industrialisation of the countries that are home to the 770 million people who still do not have access to electricity[5], continue to drive up energy requirements, particularly for electricity. In addition, process electrification (electric cars, production of hydrogen by electrolysis, electrification of industrial processes that previously used heat, etc.), and the energy losses that sometimes accompany them, are leading to an increase in energy demand.

It is estimated that electricity demand will grow at twice the rate of global energy demand each year up to 2040[5].

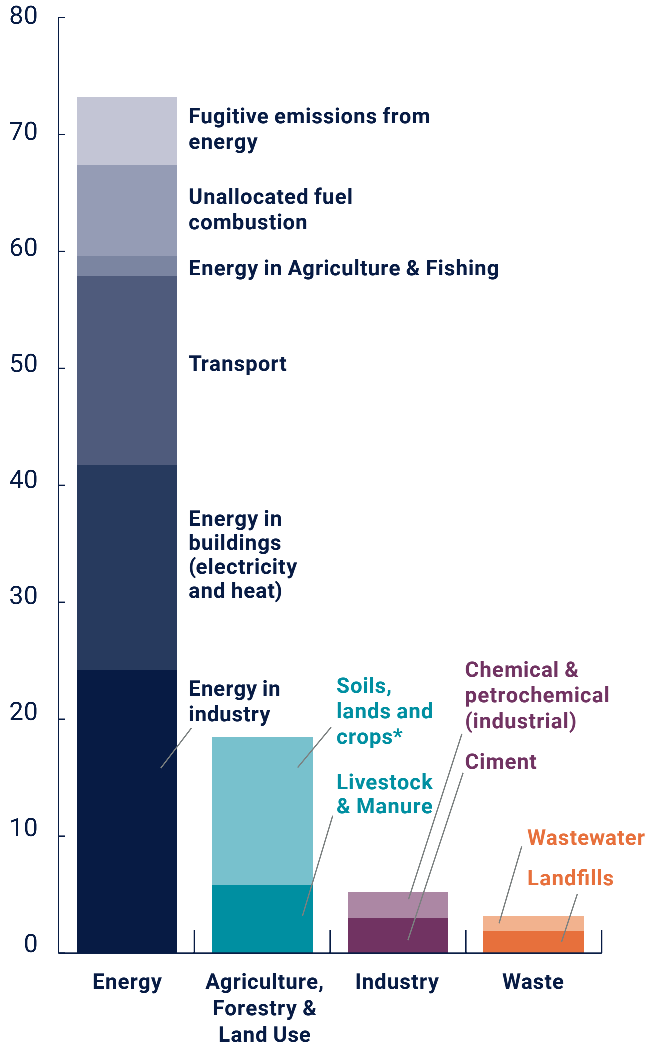
A long-term upward trend in fossil fuel prices and a geopolitical situation that together bring into question the sustainability of the current system

The growth of the 20th century was underpinned by the abundance of polluting fossil resources, whose stock is diminishing and becoming increasingly complex - and therefore expensive - to tap. The imbalance between these limited and unevenly distributed resources and the growth of the world's population and its energy needs creates a long-term increase in energy prices. This trend is currently being accentuated by the war being waged by Russia in Ukraine, which, in addition to triggering a severe humanitarian crisis, is disrupting the patterns of supply and demand.

In 2021, before the invasion, the European Union imported about 155 billion cubic metres of natural gas from Russia (about 40% of its total gas consumption)[6]. The gradual shut-off of these supplies and the international sanctions are having a direct impact on energy prices: **on a European scale, gas prices rose by 150% between July 2021 and July 2022. Electricity prices followed the same trend, rising by 281% in the first quarter of 2022 compared to the previous year**[6]. Although wholesale natural gas prices in Europe have returned to pre-Ukraine invasion levels (due to a combination of factors including a mild winter, efforts to reduce consumption and a reorganisation of the supply chain), the past year has shown the limits of a system overly dependent on fossil fuels.

Focus | **Breakdown of greenhouse gas emissions by sector**

Share of global greenhouse gas emissions (%)



* Includes agricultural soils, cropland, grassland, rice cultivation, crop burning, forest lands.

Source: The World Resource Institute (2020), "Climate Watch".

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3. United Nations (2022), *"Global Issues: Population"*
4. Our World in Data based on Vaclav Smil and BP « Statistical Review of World Energy » (2021)
5. International energy Agency (2022), "World Energy Outlook"
6. Connaissance des énergies (May 2022)

Given the critical contribution of the energy sector to climate change and the expected growth in demand, it is essential to limit our reliance on fossil fuels and instead favour models that use less carbon-intensive and more renewable resources. Current events also serve as a reminder that this is not only an ecological issue: developing alternative, more local energy sources constitutes a path towards energy sovereignty, enabling greater control over the sourcing of energy and its associated costs.

THERE ARE MANY CHALLENGES TO MEET, BUT THE SOLUTIONS AND INNOVATIONS ARE OUT THERE!

The path to carbon neutrality is a narrow one indeed, and requires **immediate action in all countries to bring about an unprecedented transformation** in the way energy **is produced, transported** and **used** around the world.

Goal:

Cut global CO_2 emissions by half between now and 2030 compared with 1990 levels, and reach carbon neutrality by the middle of the century — the conditions in which global warming will be kept to 1.5°C, according to the latest report by the IPCC[7]. This goal will be hard to reach, and in all events will need all the **following energy-related levers** to be pulled simultaneously:

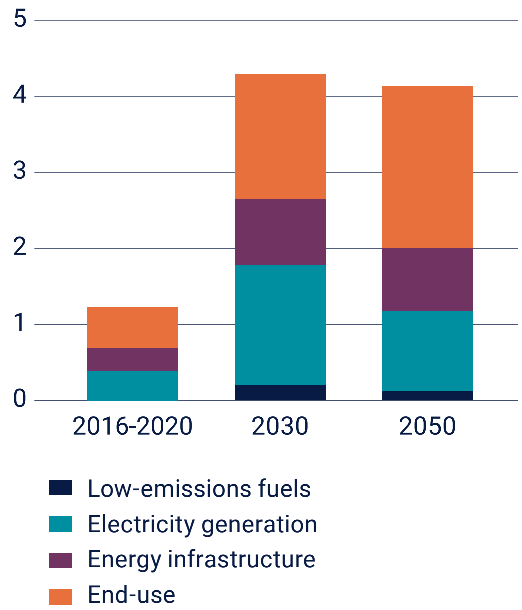
- **Increase renewable electricity generation tenfold by 2050 (compared to 2020), to reach 27,700 gigawatts (GW) installed in 2050, compared to less than 3,000 GW in 2020, according to the calculations by** IRENA[8]. This increase in renewable generation capacity requires massive investments - in both technology and infrastructure.
- **Develop heat production capacities - to meet the needs of buildings and industry in particular - also using renewable resources (biomass, geothermal, solar thermal, etc.). IRENA estimates that these energy sources will account for up to 22% of final energy demand by 2050.**

Focus | **Annual clean energy investment requirements breakdown**

Between now and 2030, we must invest at least USD 4,000 billion per year in renewable energy (including investments in technology and infrastructure) to be able to meet the target of net zero by 2050.

Source: IEA, "Net Zero by 2050"

In USD billion



- **Use alternative fuels to decarbonise the transport sector.**
- **Discontinue investment in the exploration of new fossil resources** and the development of new oil and gas fields (except for those already under construction) and develop technologies to capture and sequester CO_2 emissions.
- **Invest massively in energy efficiency** as an indispensable and complementary pillar to changing energy generation methods.

7. Intergovernmental panel on Climate Change (2019) : "Global Warming of 1.5°C"
8. IRENA, "World Energy Transitions Outlook : 1.5° C Pathway"

Close-up:
Energy efficiency

Clean energy alone will not be enough to meet net zero targets.

Massive improvements in energy efficiency are essential, as this is one of the key ways to meet growing demand by using less energy.

According to the IEA's "Efficient World" scenario, **energy efficiency should account for more than 40% of the necessary emission cuts between now and 2040.**

These solutions address all sectors of the economy (industry, transport, etc.), whether it is a matter of improving processes, increasing the performance of equipment, or introducing new materials or technical solutions.

For further details on this subject, read our article on sustainable cities.

A favourable political and regulatory environment

Regulation plays a crucial role in supporting the energy transition, both by penalising technologies that contribute to climate change and by promoting technologies that provide solutions.

Although international initiatives (e.g., the Paris Climate Agreement) have not yet fully risen to the challenge, they are evidence of a collective awareness, progressively reflected in new regulations aimed at promoting more sustainable solutions.

Among the most prominent is the **European carbon market**, created by the European Union (EU) following the Kyoto Protocol in 2005, to measure, monitor and reduce emissions from its industries and electricity producers. The European Commission also voted to set up a **carbon border adjustment mechanism** to prevent carbon leakage and encourage non-EU countries to commit to reducing their emissions. The carbon border adjustment mechanism is one of the key elements of the EU's "Fit for 55" package[9].

The "Fit for 55" plan is the most ambitious legislative package in Europe in terms of environmental policy and gives concrete expression to the European Union's ambition to become the first carbon neutral continent by 2050. It aims to adapt European policies to current environmental challenges in many sectors: climate, environment, energy, agriculture, industry, forests, waste, transport, sustainable finance, etc.

The "Fit for 55" plan was recently bolstered by "REPowerEU", which sets binding targets for the proportion of renewables in the EU's energy mix, and these targets are regularly revised upwards. First adopted in 2009, the framework set a target of 20% of gross final energy consumption from renewable sources by 2020 - a target which was later supplemented by that of the EU Directive: 32% by 2030. **In July 2021, the "Fit for 55" plan increased this 2030 target to 40%.**

The "REPowerEU" plan, published in May 2022, sets the bar even higher, at 45%, again by 2030.

With this plan, the European Commission also aims to achieve three goals:

- make the EU independent of Russian fossil fuels well before 2030, starting with gas,
- contribute to accelerating the deployment of renewable energy technologies,
- promote energy efficiency in Member States.

On the other side of the Atlantic, in August 2022 Joe Biden promulgated his vast investment plan to fight climate change and reduce inequality: the "Inflation Reduction Act". The Act provides a series of financial incentives to decarbonise the US economy, including subsidies aimed at the electric transport and renewable energy sectors. The package includes the largest ever US climate investment – USD 370 billion to reduce greenhouse gas emissions by 40% by 2030, compared to 2005[10].

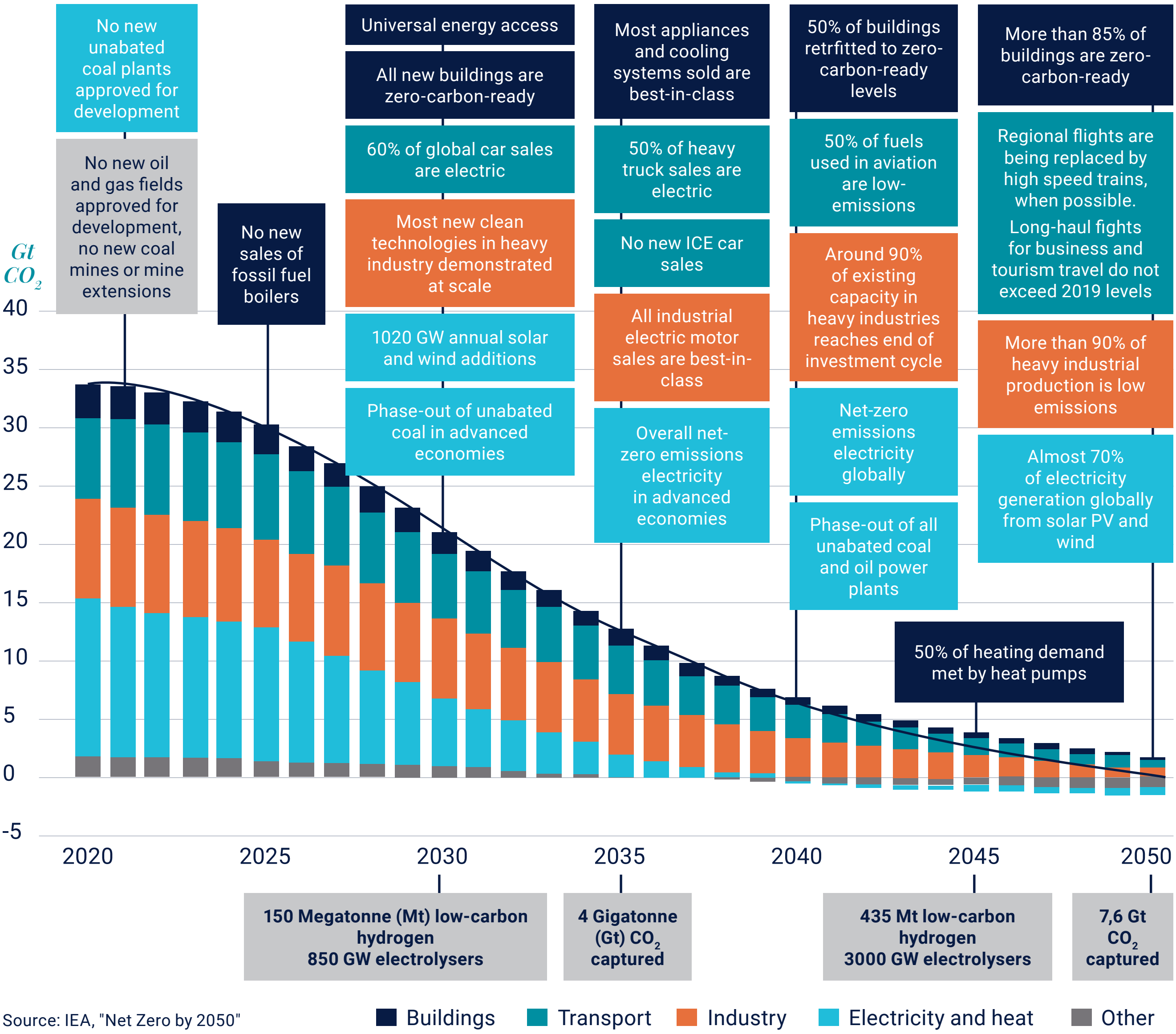
9. European Council, Council of the European Union, (March 2022), "Council agrees on the Carbon Border Adjustment Mechanism (CABM)"

10. Le Monde (August 2022)

A wide and varied range of investment opportunities

As illustrated in the chart below, the path to carbon neutrality is based on radical transformations and the development of new solutions in all sectors (construction, transport, industry, energy, etc.).

Focus | **Roadmap for the global energy sector**



Source: IEA, "Net Zero by 2050"

In the energy sector in particular, there are many challenges - all of which present investment opportunities.

▸ Technology relating to heat or electricity generation

Geothermal, biomass, photovoltaic, wind and marine energies... these resources, some of which are already being harnessed today, constitute fields of continuous innovation. The aim is to extract the maximum amount of energy at the most competitive cost possible, with minimal impact on ecosystems, and while being part of sustainable value chains. "Power kites" that transform high-altitude winds into electricity, hydraulic turbines that are less disruptive to marine life, solar panels with increased yields, systems using wind energy to propel freight ships, or modules converting the waste heat from industrial processes into electricity, are all examples of solutions falling within the energy production segment.

▸ Technologies to enable these energy sources to be better integrated into the existing power system

The stability of the electricity system depends on maintaining a constant balance between generation and demand. As such, increased generation from renewable sources - which are intermittent and difficult to predict with certainty - means greater intra-day and seasonal variability, which can undermine system stability. Furthermore, the transition from a centralised “top down” distribution system to increasingly decentralised production involving new actors - including individual consumers - requires adjustments to be made to the grid. Resource prediction, battery storage, software to better understand and manage electricity flows on the grid, optimised battery management, new electrical equipment with a reduced carbon footprint: the increase in installed renewable capacity and new modes of energy production and consumption are accompanied by reflection - and innovation - around the integration of these plants into the grid to harness their benefits.

▸ Fuels of the future

Transport - by road, air and sea - is responsible for 16% of greenhouse gas emissions. The choice of fuels we use is therefore a major issue in the energy transition. While petroleum products still accounted for 92% of the fuels used in 2018, they are expected to have almost disappeared by 2050, in favour of electric vehicles, biofuels and synthetic fuels. Biofuels, initially made from agricultural waste (first generation), are gradually being replaced by second (wood waste) and third (municipal waste) generation biofuels. They could account for up to 25% of total transport fuel demand by 2050 (compared with 3% today). At the same time, synthetic fuels (hydrogen, ammonia, e-methanol, etc.) - potentially less carbon-intensive alternatives to traditional fuels - are markets which are currently structuring (new production technologies, new equipment using them, associated logistics), and therefore also constitute investment opportunities.

Although some solutions already exist, much is still to be done to decarbonise the energy sector, which remains highly dependent on fossil fuels. New technologies are emerging, but **private equity is needed to deploy these solutions, which will contribute to the emergence of major new industries.**

THE SOLUTIONS EXIST. OUR IMPACT PRIVATE EQUITY STRATEGY CONTRIBUTES TO THEIR LARGE-SCALE DEVELOPMENT.

A strategy to boost technological innovation and make sustainable cities a reality

Our private equity strategy aims to foster and support the development of innovation in mature markets by capitalising on technological centres of excellence in Europe (with the possibility of investing up to 20% of investments in other OECD countries).

Building on a deep understanding of the market's needs and potential through close collaboration with our ESG team, we invest in companies offering **proven technology with significant impact** to accelerate their commercial deployment.

Our **different investment verticals** and their **geographical scope** allow us to address **several complementary solutions** contributing to the emergence of a sustainable city.

We bring our passion for impact, our strong personal convictions and our expertise to the companies we support, sitting on their Boards of Directors to help build value-creating governance, deliver sustainable growth and improve their resilience.

> ***We invest in companies whose entrepreneurial intelligence and capacity for innovation have yielded proven technologies to address environmental issues.***

WHEN THE SOLUTIONS EXIST:

Focus on an example of innovative investment performed by our teams.

NORSEPOWER: *Reducing the environmental impact of shipping*

- **Activity:** the company has developed and industrialised the Flettner rotor technology, harvesting wind energy to contribute to propulse cargo vessels. Implementing such equipment can lead to fuel consumption reduction reaching several hundred tons of fuel per year.
- **Founded:** 2012
- **Location:** Finland

To find out more:
www.norsepower.com

The shipping sector represents circa 3% of greenhouse gas emissions and is experiencing increased pressure to reduce its carbon footprint. Norsepower is one of the first movers on the Flettner rotor market segment and has equipped several vessels, leading to fuel consumption reductions as high as 25%.

At a glance: *Mirova's Environmental Impact Private Equity strategy*

Our belief: accelerating and scaling up positive impact drives strong financial performance. In other words, impact feeds performance.

A goal: accelerate the scale-up of innovative and positively impactful environmental solutions.

Significant potential: the shortfall in funding of UN Sustainable Development Goals is estimated at around **USD 2,500 billion per year**[1].

A multi-themed approach:

1. Agri-Agro technologies
2. Circular economy
3. Renewable energy
4. Sustainable cities
5. Natural resources

Selective targeting:

- Companies with **a business model directly addressing at least one of the targeted SDGs[2].**
- **Proven innovative solutions and technologies.**
- Companies which are implementing (or intending to implement) **rigorous ESG[3] standards.**
- Companies with **a proven business model.**
- Companies that are **profitable or about to become so**.
- **"Capital Acceleration"** equity raising campaigns to supply capital to companies in growth phase.

To summarise, a strategy aimed at both instructional and private investors offering 3 key advantages:

- **a wide impact spectrum** enabling our investors to contribute to multiple Sustainable Development Goals;
- **a handpicked selection of target companies**, from a rich and varied range;
- an attractive and diversified **risk/return profile.**

Main risks: capital loss risks, discretionary management risk, valuation risk, counterparty risk, liquidity risk, sustainability risk, ESG risk, country risk, operational risk, regulatory risk, currency risk, credit risk, currency risk, interest rate risk, investment strategy risk.

Risk and reward profile[4] :

1	2	3	4	5	**6**	7

Lower risk typically lower rewards — **Higher risk** typically higher rewards

To find out more: visit our dedicated page on our website.

1. United Nations - Sustainable Development Goals Business Forum
2. The United Nations Sustainable Development Goals (SDGs) define 17 priorities for socially equitable, environmentally safe, economically prosperous, inclusive and predictable development by 2030.
3. Environmental Social Governance
4. The scale (profile) of risk and return is an indicator rated from 1 to 7 and corresponds to increasing levels of risk and returns. It results from a regulatory methodology based on annualised volatility, calculated over 5 years. Monitored periodically, the indicator can evolve.

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Thanks to its conviction-led management style, Mirova's objective is to combine a quest for long-term value creation with sustainable development. Pioneers in many areas of sustainable finance, Mirova's talents are committed to innovation in order to provide their clients with high environmental and social impact solutions. Mirova and its affiliates manage €27.2 billions as of 31 December 2022. Mirova has been awarded the B Corp* label and the status of "mission led company". *References to a ranking, award or label do not prejudge the future performance of the fund or the manager.

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RCS Paris n°394 648 216
Registered Office: 59, Avenue Pierre Mendes France
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French Public Limited liability company
RCS Paris n°453 952 681
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