

A journey to the heart of the sustainable city



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When mobility has to lead its revolution

- 1. The transport sector is accountable for 28% of greenhouse gas emissions in Europe¹.**
- 2. Worldwide:**
 - ▶ **7 million premature deaths each year²** caused by pollution from particulate matter, nitrous oxides and heavy metals.
 - ▶ **2 billion vehicles on the road in 2050** and 115,000 billion kilometres travelled by passengers across all transport modes¹.
- 3. Powertrain transformation, improved energy efficiency, PM capture:** innovative solutions do exist!
- 4. Financing requirements of innovative transport companies in Europe** estimated at between 6 and 13 billion euros per year³.

Episode 1: When growth capital builds the clean mobility of tomorrow

At the heart of social and societal issues, cities and urban areas are one of the drivers of climate change, causing collateral damage to biodiversity, resources, air and health. At the forefront, the transport and construction sectors are facing a challenge of unprecedented magnitude: to transform themselves fundamentally in order to drastically reduce their impact on the environment.

In this context, Mirova's Impact Private Equity strategy focuses on solutions and technologies that will help to make sustainable cities a reality.

In this article, we take a closer look at mobility.

TRANSPORT FACING ONE OF THE CHALLENGES OF THE CENTURY

A fast-growing sector with harmful consequences on the environment

Responsible for nearly 75% of global CO2 emissions, cities – and more generally urban activities, starting with transport – have a major impact on the environment.⁴

With the world's population increasing and urbanisation growing (from 30% in 1950 to 55% in 2018, it is anticipated that 70% of the population will be living in urban areas in 2050⁵), total demand for passenger transport¹ is also on the rise: after 53,000 billion kilometres in 2015, it is expected to increase to almost 70,000 billion in 2030 and to around 115,000 billion in 2050. These projections are corroborated by others relating to the growth of the vehicle fleet – directly linked to the increase in the standard of living – which forecast that almost 2 billion vehicles will be in circulation by 2050.

1. McKinsey, Making sustainability a priority in transport infrastructure 2021
2. Institute for Health Metrics and Evaluation (IHME), Global Burden of Disease, 2020
3. European Investment Bank, Financing innovation in clean and sustainable mobility
4. UNEP, Cities and Climate Change
5. United Nations, World Urbanization Prospects: Highlights



In view of these prospects, two facts may be highlighted:

- ▶ **1. The transport sector is the leading cause of greenhouse gas (GHG) emissions** in the European Union (EU), as it accounts for approximately **28% of total emissions**, on a rising trend in recent years.⁶ Greenhouse gas emissions from mobility are growing annually by about 0.8%⁶ – with passenger cars accounting for the largest share.

On a global scale, road transport accounts for 15% of total CO₂ emissions⁶.

- ▶ **2. The transport sector is the leading cause of air pollution.** Almost 45% of the pollution caused by road traffic consists of particles from non-exhaust gases, with around 20% of that pollution coming from brake dust⁷, which is also the main source of emissions from trains.

In addition to this dust, there are also **micro-particles** – also known as ‘particulate matter’ – such as **NOx** (nitrous oxides), **SOx** (sulphur oxides) and **VOCs** (volatile organic compounds) from combustion engines.

Greenhouse gas and particulate matter emissions affect not only the climate but also air quality, and cause damage to health and biodiversity.

Serious consequences on health and biodiversity

In addition to the environmental damage caused by transport, **air pollution has direct and indirect consequences for humans, as it is one of the main risk factors for illness and death in the world.**

Besides being associated with many chronic health problems, including **lung disorders, heart disease, stroke and cancer**⁷, pollution from particulate matter, nitrous oxides and heavy metals is responsible for more than **7 million premature deaths worldwide each year**⁸. Brake dust pollution can be as harmful to immune cells as diesel exhaust.

And yet, nearly 8,000 premature deaths could be avoided each year in the Paris region alone if the World Health Organisation's (WHO) recommendations on air quality were respected.⁹

But it is not only humans who are affected: animals – and biodiversity as a whole – are impacted by transport. **In cities, a loss of biodiversity can be observed due to air pollution**¹⁰, which impairs the sense of smell of bees and other insects involved in the fertilisation of flora, making it impossible for them to identify and trace plant scents: on plants exposed to polluted urban air, scientists have shown a **reduction in pollination of around 14 to 31%**.

6. International Energy Agency, Tracking Transport 2021

7. The Conversation, "Air pollution from brake dust may be as harmful as diesel exhaust on immune cells".

8. Institute for Health Metrics and Evaluation (IHME), Global Burden of Disease, 2020

9. Le Monde, "Pollution de l'air: 8000 décès par an pourraient être évités en Ile de France".

10. Yale, "La pollution atmosphérique rend plus difficile le reniflement des fleurs par les abeilles".

The only remedy: the fundamental transformation of the mobility model

The transport sector must reinvent itself as a whole: manufacturers, transporters, drivers... everyone has a part to play. And the equation is proving to be complex to solve:

- ▶ The goal is to **reduce travel and movement as a whole, whereas the transport of goods and people is increasing** due to the influence of a growing world population and growing consumption...
- ▶ ...while also **drastically reducing the impact of mobility** on the environment and human beings.

On an encouraging note, the current context – particularly in terms of regulations – is conducive to the development of more environmentally friendly mobility. Such is the case of the **European Green Deal**, through which the EU, having set itself the goal of **becoming the first climate-neutral continent by 2050**, is demanding **ambitious changes in the transport sphere**.

Mobility must be more **sustainable** by reducing all types of emissions and developing alternative fuels, more **intel-**

ligent by exploiting the full potential of data and developing new usage models, and more **resilient** by reducing dependence on fossil fuels.

At EU level, all these targets fall within the “Fit for 55”¹¹ framework, which aims to bring EU legislation into line with the 2030 target of **reducing net greenhouse gas emissions by at least 55% by that date**. It is the most ambitious European legislative package on environmental transition, both in terms of time horizon and sectoral implications.

On a national scale, France has set itself the objective of **completely decarbonising the land transport sector by 2050**¹², which should entail the gradual replacement of the entire French car fleet and the end of sales of new light vehicles running on fossil fuels by 2040.

Transporting more by impacting less: only the transition to sustainable mobility will help solve this equation.

Made possible by a propitious context and political, industrial and civic resolve, this transport revolution should be facilitated by major technological innovations – some of which is already underway while other examples are yet to be invented.

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 Impact 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.

11. Fit for 55 the most ambitious European legislative package dealing with the environmental transition, both from a time horizon perspective and for its sectoral implications. The Fit for 55 measures aim to reduce Member States’ greenhouse gas emissions by 55% by 2030 compared to 1990.

12. Mobility Framework Act (LOM) – December 2019





When technological innovation helps make sustainable mobility and cities a reality

A wide range of solutions already address the demand for transport while reducing its negative impacts. They can be divided into four categories:

Transformation of powertrains

With the development of renewable energy and low-carbon electricity, increasing electric mobility is a viable solution to drastically reduce emissions from private vehicles.

To speed up the development of a mobility that emits and consumes less energy, it is obviously necessary to engage in the mass production of electric vehicles.

But in parallel, we must also focus on retrofitting technologies that enable traditional combustion engines vehicle to be transformed into electric vehicles, hybrid vehicles or even hydrogen vehicles.

Replacing diesel and petrol with alternative fuels is another solution that can be deployed.

Improving energy efficiency and reducing emissions

Unlike combustion engines, whose average efficiency does not exceed 40% (60% is lost to heat and friction¹³), electric vehicles are more energy efficient, consuming much less energy than combustion engines to cover the same distance.

Moreover, only 12 to 30%¹⁴ of fossil fuel is ultimately converted into motive power, whereas electric vehicles manage to transform 77% of electrical energy into power that can be used directly to drive the vehicle, while recovering kinetic energy from braking.

While also improving vehicle aerodynamics and reducing friction, it is essential to improve the energy efficiency of the existing fleet and reduce emissions by using anti-pollution technologies such as NOx adsorbers, selective catalytic reduction and exhaust gas recirculation.

“

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

”

13. <https://uk.mer.eco/news/ev-vs-ice-are-electric-cars-worth-it/>

14. US Department of Energy

Transferring mobility

This consists of moving from a logic of individual mobility to a collective logic, **by encouraging travel on transport modes with high energy efficiency and low pollution per unit transported.**

Intelligent limitation of travel and consumption

The least emissive mobility remains that which consists of limiting travel as much as possible, and/or reducing the distance of travel.

It is therefore essential to develop technologies to optimise mobility, avoid travel where possible and favour car sharing and carpooling.

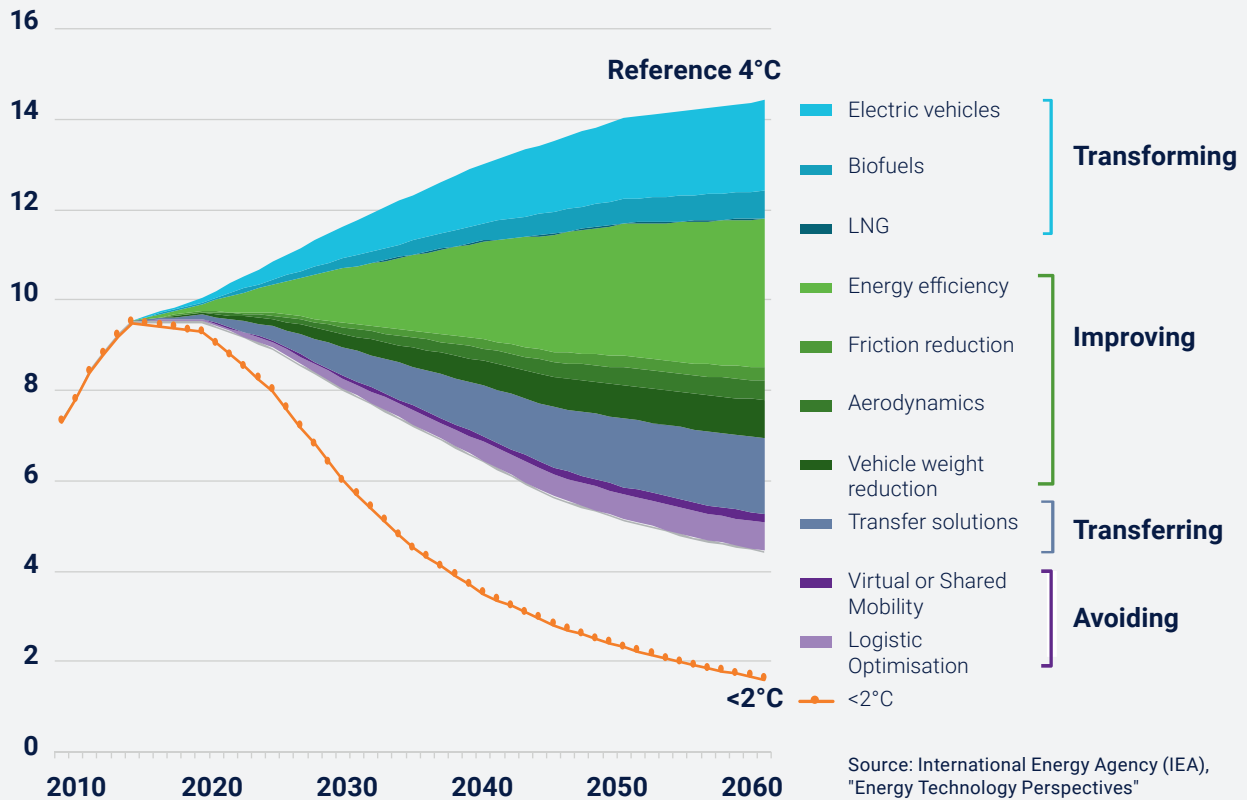
Public awareness and individual responsibility are also part of the levers that can be activated, such as the initiative proposed by Toyota in Sweden, "Drive Like You've Got a Glass of Water on your Dash", which can reduce fuel consumption by 10%.¹⁵

¹⁵<https://www.popularmechanics.com/cars/a5996/new-toyota-mpg-initiative>



Focus on: *Greenhouse gas emission reduction potential by category*

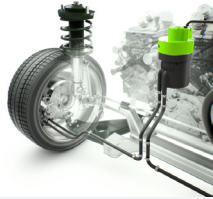
Greenhouse gas emissions (Gt/year)



WHEN THE SOLUTIONS EXIST:

Focus on an example of innovative investment performed by our teams

TALLANO TECHNOLOGIE: *A cutting edge Cleantech*



► **Activity:** An engineering firm bringing together professionals from the automotive, aeronautical and financial sectors, Tallano Technologie's mission is to address public health concerns by fighting particulate matter pollution.

► **Founded:** 2012

► **Founder:** Christophe Rocca-Serra

► **Head office:** Boulogne-Billancourt, France

The ground-breaking solution: Tamic[®], a pioneering system capturing particles emitted during braking.

The braking system of a car emits six times more particulate matter than the exhaust system: 30 mg/km compared with 5 mg/km¹⁶. Using the Tamic[®] system cuts the brake dust emissions¹⁸ of fitted vehicles and trains by 90%, making the air healthier to breathe.

- the system is fitted directly onto the brakes;
- it can be used on a range of vehicles: cars, trucks, trains, underground light rail, etc.;
- it can withstand both very low and very high temperatures;
- it is lightweight and self-contained and does not affect vehicle performance;
- 29 patent applications have been submitted in a dozen countries.

With this solution, Tallano Technologie provides a concrete response to public health issues while anticipating changes in regulations (in 2025, the Euro7 Transport standard is expected to include fine particulate emissions thresholds associated with braking for the first time).

“I am proud that Tallano Technologie has become a global player in the fight against air pollution.”

Christophe Rocca-Serra, CEO-Founder

For more information on Tallano: www.tallano.eu

16. Tallano Technologies



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 for United Nations Sustainable Development Goals is estimated at around USD **2,500 billion per year**¹.

A multi-themed approach:

1. Agri-Agro technology
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.**

To find out more: visit our dedicated page on our website and discover the presentation of our investment strategy in pictures.



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

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