



*ELECTRIC MOBILITY IS SPEEDING UP*  
***MICHELIN'S***  
*GOAL OF A 100%-SUSTAINABLE TIRE*

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# CONTENTS

<b>THE INNOVATIONS DEVELOPED FOR THE TIRE GO BEYOND THE SIMPLE CHALLENGES OF THE ELECTRIC VEHICLE</b>	<b>01</b>
<b>THE SPECIFIC POINTS OF AN ELECTRIC VEHICLE</b>	<b>02</b>
<b>THE 3 CHALLENGES FOR A TIRE TO REDUCE ITS ENVIRONMENTAL FOOTPRINT:</b>	
Vehicle fuel or energy consumption: Michelin has halved rolling resistance in 30 years	<b>03</b>
Regardless of the vehicle's engine type, long life and a high level of performance are two inseparable requirements when designing a Michelin tire	<b>04</b>
Tire wear particles, another major challenge to overcome	<b>05</b>
<b>A PRAGMATIC AND GLOBALIZED APPROACH FOR ALL MICHELIN TIRES</b>	<b>06</b>



“ **Michelin tires are designed,  
without distinction, for all cars,  
regardless of how they are powered** ”

## THE INNOVATIONS DEVELOPED FOR THE TIRE GO BEYOND THE SIMPLE CHALLENGES OF THE ELECTRIC VEHICLE

In order to make its tires safer, more connected, and kinder to the environment, Michelin invests more than one billion euro into research and innovation every year.

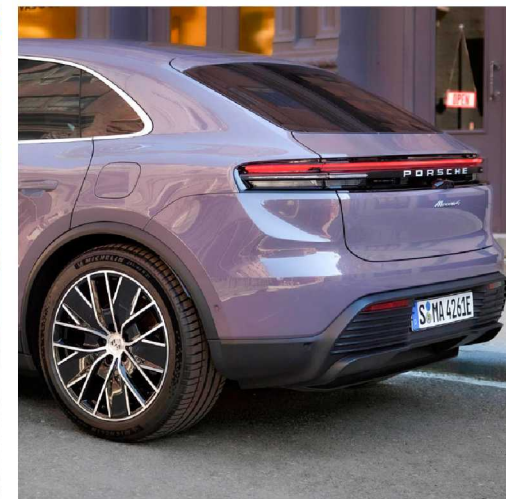
Despite being consistently round and black, a tire is jammed packed with technology allowing it to carry up to 250 times its own weight, and its formula can include 200 materials. It's an item of equipment from which we ask a lot, according to criteria that can sometimes be contradictory. Of course, it must provide perfect grip, brake over the shortest distance possible, last a long time, and also consume the least amount of energy, afford good comfort, make as little noise as possible and transfer the vehicle's power to the ground, whether wet or dry.

Today, it must also overcome environmental challenges, which presupposes performing ever better while being as kind to the environment as possible. A challenge that goes from extraction of the raw materials that are used in its manufacture right up to recycling at the end of its life. Between these two phases, the tire must offer the best lifespan with an excellent performance level throughout its life, and perfectly safe usage.

In the desire to have all car drivers profit from Michelin's latest technological advances, all the Group's ranges benefit, depending on their specifications, from all these innovations. They provide a level of requirement meeting that expected of a combustion engine, hybrid, or electric car, by reconciling lifespan, torque, range, weight and noise.

**In this way, the Group is developing a global tire approach for cars and allowing its customers to choose their tires in accordance with their use and not their car's power source.**

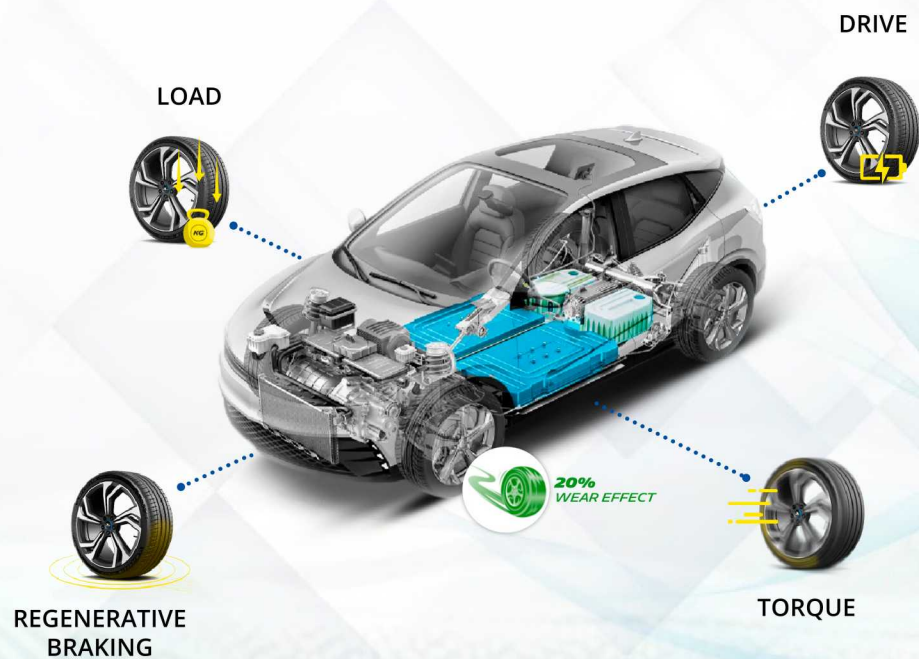
**Whether summer, winter, four-seasons or sports, Michelin tires therefore offer the best of all its technologies, for all uses and without distinction between vehicles.**





## THE SPECIFIC POINTS OF AN ELECTRIC VEHICLE

Electric vehicles are refocusing consumer and constructor attention on overall tire performances.



**4 PERFORMANCES ARE PARTICULARLY VISIBLE.**



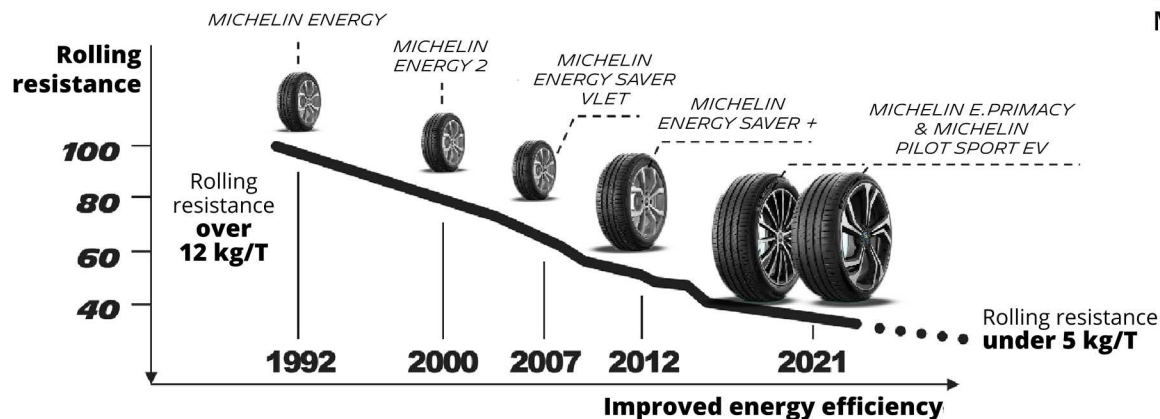


## VEHICLE FUEL OR ENERGY CONSUMPTION: MICHELIN HAS HALVED ROLLING RESISTANCE IN 30 YEARS

The tire has the most impact during its usage phase. Alone, it represents approximately 80% of the total impact from a car tire's life cycle. Michelin has been working for decades on one of the biggest environmental challenges relating to our travel: fuel or energy consumption. To limit this, Michelin's engineers have worked on the energy efficiency of tires, also known as rolling resistance, which is responsible for approximately 20% of a car's energy consumption, irrespective of its engine type. If we translate this data point to the world of combustion engine vehicles, we see that the tire "consumes" almost one in five tanks of fuel.



Thanks to multiple Michelin innovations in the field of high-tech materials, which include the introduction of silica into the rubber mixtures, the rolling resistance of our ranges has been halved over the last few decades. At the end of the 1980s, a tire fitted to an average car displayed a rolling resistance of 12 kg/T (kilograms per metric ton). Then, with the arrival of the MICHELIN Energy ranges, in 1992, this figure dropped to under 10 kg/T. Today, the MICHELIN e.Primacy or MICHELIN Pilot Sport EV procure the excellent result of 5.5 kg/T. **A performance that Michelin intends to improve by yet another 10% between 2020 and 2030.**



**OBJECTIVE 2030:**  
Improve rolling  
resistance by +10%



“ **The #1 environmental quality of an object is to be high performance for as long as possible** ”

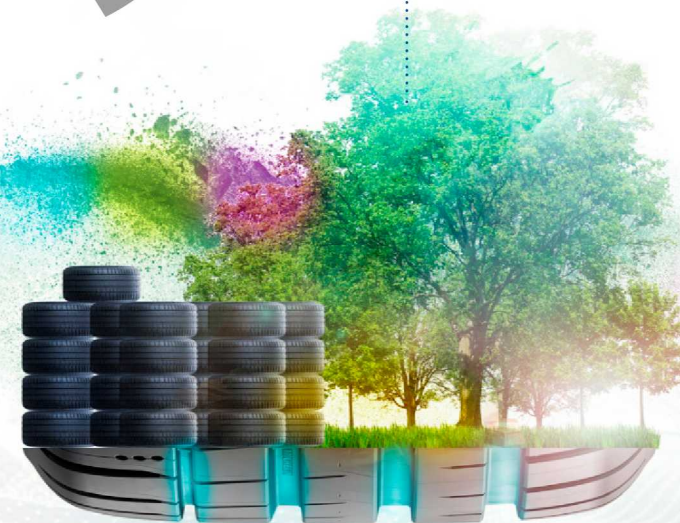
REGARDLESS OF THE VEHICLE'S ENGINE TYPE, LONG LIFE AND A HIGH LEVEL OF PERFORMANCE ARE TWO INSEPARABLE REQUIREMENTS WHEN DESIGNING A MICHELIN TIRE

As part of a sustainable approach, it's essential to offer the best lifespan for a tire that furnishes a very high performance level and perfectly safe usage. It is the guarantee that the consumer can use their tires in complete safety from the first to the last mile. It is also among the main consumer expectations, irrespective of their vehicle and especially when this is electric, according to two studies\*\* carried out in 2023 for Michelin in Europe, the United States, and China.

Providing tires that perform highly over time is in Michelin's DNA and stems from a design choice made by the Group. For this reason, Michelin supported the development of European Regulation R117-04 on the performance of new tires once worn. It allows for guaranteeing better safety on the roads, and also for responding to the challenges of protecting both the planet's resources and the purchasing power of European motorists.

Globally, 50% of tires are removed prematurely every year, which corresponds to 400 million tires scrapped before having reached their legal wear limit of 1.6 mm. This is a phenomenon that Michelin is combatting with high-tech tires that provide high performances, even when the tire is worn.

**400 MILLION TIRES**  
are scrapped prematurely every year



**50% OF TIRES**  
are removed before reaching a residual depth of 3 mm

## CONSUMER PREFERENCE FOR ELECTRIC VEHICLE TIRES

Tires that give me confidence to drive **in all weathers**

Tires that **last as long as possible** before being replaced

Electric Vehicle owners  
N=440



25%

20%

Electric Vehicle owners  
N=281



21%

19%

Electric Vehicle owners  
N=472



23%

24%

IN ALL WEATHERS

LONG-LASTING TIRES

\*\* Martec Study, USA - Oct. 2023  
Source: Gipa Norway 2023 (1148) & GIPA Cina 2021-2022  
Source: <https://www.fhwa.dot.gov/ohim/onh00/bar8.htm>

\*\* Yougov Study, Dec. 2023  
(EUR & CHN) MICHELIN.  
With regards to tires for electric vehicles (EV), which of the following elements is the most important to you?  
Basis: all adults who currently own or lease a traditional petrol car, a hybrid car, or an electric vehicle.

## TIRE WEAR PARTICLES, ANOTHER MAJOR CHALLENGE TO OVERCOME

While most of a tire's environmental impact is produced during its usage phase, some of this impact stems from particles emitted due to tire wear and the road. This is even more true of an electric vehicle.

Michelin is investing strongly into research and development in this field as well, in order to design tires that greatly reduce abrasion levels, and has declared itself to be in favor of a global regulation to limit tire wear particle emissions by setting abrasion limit values. These means eliminating from the market the least performing tires in this regard.

According to an ADAC study published in March 2022, and tests performed by DEKRA at Michelin's request on over 2,000 market tires between 2013 and 2018, it appears that 4 **MICHELIN CrossClimate2** tires emit a total of 1.5 kg\* of particles during 20,000 km of use in one year. This is over two times less than the market average (3.5 kg\*), while the least performing tires measured emit 8 kg\* of particles.

**4 TIRES** on a vehicle travelling  
20,000 km per year; particles  
emitted just by the tires\*

**5% DROP**  
In global wear particle emissions  
from Michelin tires between 2015 and 2020



\*rubber part only = measured by the loss of mass due to wear during the wear tests.



“ **All the electric vehicles  
will only represent 12%  
of the vehicle fleet by 2030.** ”

## A PRAGMATIC AND GLOBALIZED APPROACH FOR ALL MICHELIN TIRES

In order to continuously reduce its environmental footprint, Michelin is carrying out an assessment for each of the 5 life-cycle stages for each of its ranges: development, manufacture, transport, usage and end of life.

Before being marketed, each new tire must be better performing and also more efficient than its predecessor. Michelin wants all its tires to comprise 100% renewable or recycled materials by 2050, with a maintained, or even improved, performance level and for these to be able to meet the needs of all vehicles, without distinction.

**For the Group, which is now one of the leaders in the electric vehicle market, equipping 15 out of 22 major constructors, this is the only efficient strategy for a truly wide-scale impact on the environment.**

In fact, even though they represent unique opportunities for the group by refocusing consumer and constructor attention on the tire, electric vehicles will only represent 12% of the vehicle fleet by 2030. If we want fast and wide-scale action, we cannot dedicate the best technologies purely to electric vehicles, we must make them available in all our ranges, whether the vehicle is powered by combustion engine or electricity.

“ **In the last 12 years,  
Michelin has obtained over  
310 homologations.** ”

THE MARKET  
GROWTH RATE  
REMAINS  
DEPENDENT

USA  
Carbon neutral  
by 2030

EUROPE  
Carbon neutral  
by 2050

CHINE  
Carbon neutral  
by 2060



GOVERNMENT  
POLICIES

The goals 2030:  
50% BEV



CAR MANUFACTURERS

Charging  
network

Vehicle  
price

Usage costs



**A TIRE MUST BE CHOSEN IN ACCORDANCE WITH ITS USE**



**Photos available on:**

<https://contentcenter.michelin.com:443/portal/shared-board/4c5ac71f-ea5e-4c1c-943f-f7177fe2f022>

**PRESS CONTACTS:**

Florence Marchand – Stéphanie Falies – MICHELIN GROUP PRESS RELATIONS: +33 (0) 1 45 66 22 22

**About Michelin**

Michelin is developing world-leading manufacturing of composites and experiences that transform our everyday lives. A pioneer in the science of materials for over 130 years, Michelin relies on unique expertise to make a significant contribution to human progress and to a more sustainable world.

Thanks to its unequalled mastery of polymer composites, Michelin is constantly innovating in order to produce high quality tires and critical components for demanding sectors such as mobility, construction, aeronautics, low-carbon energies, and healthcare. The care taken with its products and its intimate knowledge of their uses allow it to provide its clients with exceptional experiences, whether these are solutions based on data and artificial intelligence for professional fleets, or the discovery of remarkable restaurants and hotels recommended by the MICHELIN Guide.

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