MICHELIN X® LINE™ ENERGY™ D2

315/70 R 22.5 154/150L

EPD®

THE INTERNATIONAL EPD® SYSTEM

Environmental Product Declaration

In accordance with ISO 14025:2010

EPD® REGISTRATION NUMBER: S-P-04441

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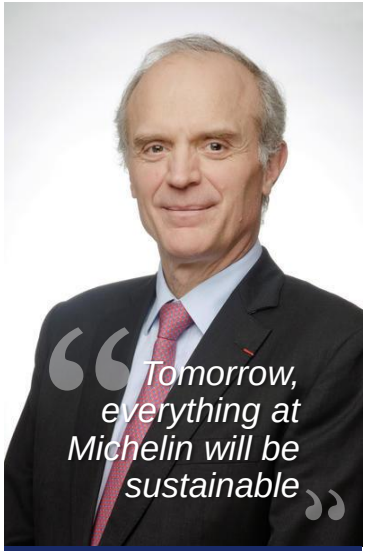
VALIDITY DATE: 22/11/2026



Florent Menegaux,
Chief Executive Officer

OUR PURPOSE

OFFERING EVERYONE A BETTER WAY FORWARD

Because we believe that mobility is essential for human development, we are innovating passionately to make it safer, more efficient and more environmentally friendly.

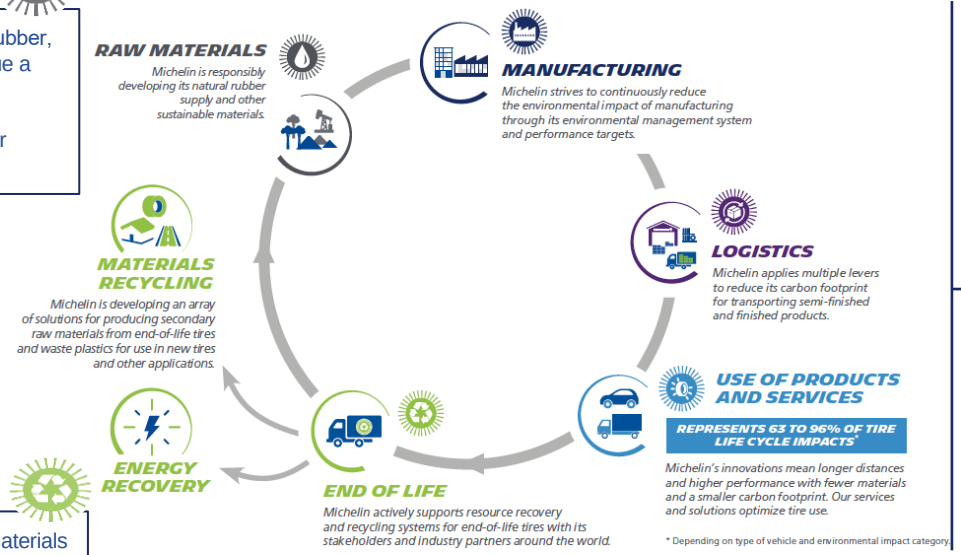
Our priority and firm commitment is to offer our customers uncompromising quality.

Because we believe that all of us deserve personal fulfillment, we want to enable everyone to do his or her best, and to make our differences a valuable asset.

Proud of our values of respect for customers, people, shareholders, the environment and facts, we are sharing the adventure of better mobility for everyone.

SUSTAINABILITY MEANS REDUCING THE LIFE CYCLE IMPACTS OUR PRODUCTS & SERVICES

As one of the world's leading users of natural rubber, Michelin was the first tire manufacturer to pursue a sustainable
sourcing strategy built on the principles of zero deforestation, land conservation and respect for supplier communities.



We are developing a range of sustainable materials solutions, including micronized rubber powders from scrap tires
and bio-sourced butadiene and resins.

Across the value chain Michelin is:

- ✓ Reducing CO_2 emissions to achieve its targets validated by SBTi*
- ✓ Taking multiple actions under its biodiversity commitments
- ✓ Integrating life cycle assessment into the tire design process

ON THE PATH TO REACH CARBON NEUTRALITY

MANUFACTURING
Scopes 1 & 2 (2)

Reduction in energy consumption + **Shift towards clean energy**

2030: **-50%** (4) CO_2 emissions vs 2010

2050: **CARBON NEUTRALITY** (1)

LOGISTICS
Scope 3 (3)

Transport less, better and differently

2030: **-15%** (4) CO_2 emissions vs 2018

2050: **CARBON NEUTRALITY** (1)

SUPPLY CHAIN
Scope 3 (3)

2024: **70%** (5) of emissions from suppliers covered by science-based targets

2050: **CARBON NEUTRALITY** (1)

ON THE PATH TO REACH FULL CIRCULARITY OF PRODUCTS

with 40% of sustainable raw materials in 2030, 100% in 2050

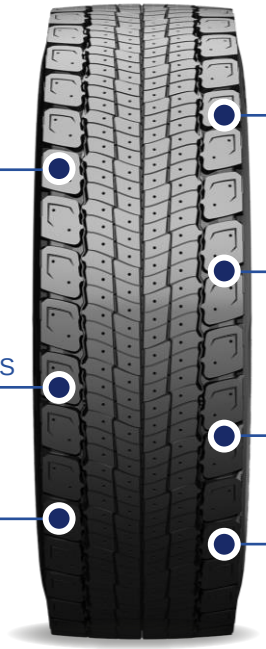
REDUCE REUSE RECYCLE RENEW

NATURAL RUBBER

SYNTHETIC RUBBER

** BIOBUTTERFLY

PYROWAVE



FILLERS

enviro SCANDINAVIAN ENVIRO SYSTEMS TYRE RECYCLING

BLACK CYCLE

LTLehigh TECHNOLOGIES

PLASTIFIERS

ResiCare

* BLACK CYCLE

BIOIMPULSE

METALS

MICHELIN

TEXTILES

CARBIOS

OTHER

MICHELIN

PLANET

** European project funded by Horizon 2020, project number : 82068*

*** With the support of ADEME (ADEME: French Environment & Energy Management Agency)*

AMBITIONS FOR 2030

act4nature international

(*) Replacement of pesticides and fertilizers by mechanical methods combined with other alternative solutions

SUSTAINABLE MOBILITY FOR TRANSPORT SOLUTIONS

Sustainability is at the core of what we do, a driver for growth and part of our ongoing journey toward All Sustainable Transport Solutions

WHY THIS EPD?

Corporate Michelin pledge is “Everything will be sustainable”.
We have developed an offer designed to contribute to a safer, greener, more efficient and more accessible mobility.

Our approach is now more comprehensive approach, long-term **and fully transparent:** the **Environmental Product Declaration (EPD)** is a mark of our good faith to take into account the total **environmental impact of our products.**

Several types of environmental impacts were evaluated in this life cycle assessment with **a LCA :**

- direct impacts to global warming and to ecosystem and human health
- indirect impacts from the use and reuse of resources.

This EPD is based on verified life cycle analysis (LCA) data. It summarizes and communicates transparent and comparable information about the **environmental impact of the product at each phase of its life cycle,** to inform our customers and other interested parties.

MICHELIN X LINE ENERGY Z2 & D2

Go further with lower fuel consumption for Long-Haul applications

SAFE — EFFICIENT — GREEN — ACCESSIBLE

Safe in all road conditions[4]

- ✓ Precision and comfort for an improved driver experience
- ✓ Optimised grip and braking on wet roads during the entire tyre life

Operating cost reduction

- ✓ Fuel savings[1]
- ✓ Low Total Cost of Ownership[2]
- ✓ Best-in-class Rolling Resistance (grade A) & excellent mileage potential[3] combination

Less environmental impact for more performance[5]

- ✓ Low raw material consumption[5]
- ✓ Less CO2 emissions[1 & 6]

Right market coverage with a highly desirable tyre range

- ✓ Deployed on awaited main dimension[7]
- ✓ Preferred fitment from main OEMs for Long-Haul application[8]

1/ Reduce fuel consumption by 0.8l/100 km in comparison with previous MICHELIN X LINE ENERGY generation thanks to grade A labelling in rolling resistance. Certified value using VECTO calculation tool comparing CO2 emissions of standard 445kW/12.7l tractor-trailer ensemble equipped with MICHELIN X® LINE™ ENERGY™ Z2/D2/T with grade A labelling for rolling resistance and the same vehicle equipped with MICHELIN X® LINE™ ENERGY™ Z/D/T having grade B labelling in rolling resistance , in long haul usage and average cargo load of 17t.
2/ Total cost of ownership comparison made between MICHELIN and its premium competitors having a RRT grade A in 315/70R22.5 tire size. Using for price positioning a panel of published European competitor price lists in 2020 ; for wear comparison: information on Internet website publication, competitors' representative interview and field data collection made in 2020 and 2021 ; for fuel efficiency: rolling resistance labelling.
3/ Demonstrated in an onfield mileage study (DEKRA report n# 19CPA11-129 - Echemar) performed in Spain in 2019-2021
4/ Labelling B for wet grip and 3PMSF marking. Performances at worn stage thanks to Regenion Technology (self-regenerating tread blocks – new grooves emerge over the tyre life for enhanced mobility).
5/ MICHELIN X LINE ENERGY Z2 and D2 have reduced weight by more than 5% in comparison with previous X LINE ENERGY generation
Average Weight of 315/60R22.5 MICHELIN X LINE ENERGY Z2 and D2 are 56,4kg and 58,7kg in comparison with previous tire generation 315/60R22.5 MICHELIN X LINE ENERGY Z and D, 61,8kg and 60,8kg.
Certified value using VECTO calculation tool comparing CO2 emissions of standard 445kW/12.7l tractor-trailer ensemble equipped with MICHELIN X® LINE™ ENERGY™ Z2/D2/T with grade A labelling for rolling resistance and the same vehicle equipped with MICHELIN X® LINE™ ENERGY™ Z/D/T having grade B labelling in rolling resistance , in long haul usage and average cargo load of 17t.
6/ up-to 2.2 T of CO2 emissions / 100 000 km in comparison with previous MICHELIN X Line Energy generation thanks to grade A labelling in rolling resistance (VECTO tool calculations).
7/ The dimension 315/70R22,5, the only one available within MICHELIN X LINE ENERGY Z2/D2 range represents a massive (more than 70%) and growing part of the Long Haul usage market (ETRMA data 2015-2021).
8/ Brand choice : "GFK 2017" study, for a panel of 954 buyers of new articulated trucks, located in Germany, Poland and the United Kingdom: MICHELIN is the brand most often chosen in optional mounting ; Tyre range choice : "KBI 2019" Michelin internal study: The MICHELIN X LINE ENERGY range is the highest-selling MICHELIN reference in Europe in 2019, sold by MICHELIN to the following truck manufacturers: Renault, Daf, Volvo.

MICHELIN X LINE ENERGY Z2 & D2

Michelin, the first truck tire manufacturer to go through EPD registration, showing alliance of sustainable mobility and high performance thanks to the latest Michelin technologies

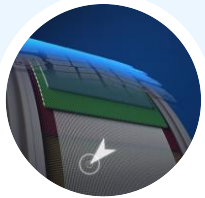
SAFE — EFFICIENT — GREEN — ACCESSIBLE

REGENION

Self-regenerating tread blocks, supported by MICHELIN mold 3D metal printing technologies, providing solid **grip** throughout the tire's **lifetime** and conditions. New grooves emerge over the tire's life for enhanced **mobility.** The more **compact** and **rigid** tread pattern provides higher **mileage,** higher **aggression resistance** and lower **fuel consumption.**

INFINICOIL

A **continuous steel wire** – which can be as long as 400 meters – wrapped around the tyre provides it with greater **stability** throughout its lifetime. The tyre's **endurance** is enhanced with higher **load index** or harder **usage conditions.** It improves the casing **mileage potential** and enhances **fuel savings.**



POWERCOIL

A new generation of more **robust** steel cables offers a better **oxidation resistance** and enhances the casing **endurance.** It improves the casing **mileage potential.** These steel casing cables are lighter leading to a better **rolling resistance.**

MICHELIN X LINE ENERGY

315/70R22.5 MICHELIN X LINE ENERGY D2 TL 154/150L

SYNTHETIC RUBBER
6.69kg (11.3%)

NATURAL RUBBER
21.88kg (37.1%)

STEEL
11.86kg (20.1%)

SILICA
4.58kg (7.8%)

CARBON BLACK
9.42kg (16.0%)

OTHER MATERIALS*
4.57kg (7.7%)

*Chemicals and additives

Source: EPD based on LCA, October 2021

CONTENT DECLARATION

EPD type & region of applicability:
Cradle to grave, Europe

Tire designation information:

- Tire size: 315/70 R22.5
- Tire mass: 58.99 kg
- Tire sub-categories: Long Haul truck tire
- Nominal section width: 315mm
- Aspect ratio: 70
- Casing construction: 5 Steel plies
- Rim diameter: 22.5 inches
- Load index: 150
- Speed rating: L

Retreadability:
Yes

Rolling resistance coefficient value:
4.0 kg/t

Tire category:
Long Haul truck tire

Functional unit:
1 tire driven 1000km

LCA software:
Simapro release 9.1.1.1

LCI databases:
Ecolvent 3.6

Plant:
Michelin plant in Aranda, Spain

An EPD® within the same product category but from different programmes may not be comparable.

Calculated impacts are only related to tires within the scope of this PCR and shall not be compared to vehicle performance.

UNDERSTANDING ENVIRONMENTAL IMPACTS

- **Contribution to global warming** is measured by the emission of **greenhouse gases.**

Ecosystem health impacts are measured by:

- Emissions of sulfur dioxide and other chemical substances that create **acid rain** which in turn damages terrestrial and freshwater ecosystems in a process called “acidification “
- Released chemicals that damage **the ozone layer** and its ability to absorb ultraviolet radiation that is harmful to plant life
- Nutrients that **degrade freshwater bodies** through the loss of oxygen and acidification in a process called “eutrophication”

Human health impacts are measured by:

- **Air pollution** caused by:
  - emissions of **particulate matter**
  - formation of **photochemical ozone,** a major contributor to **smog**
- released chemicals that **damage the ozone** layer and its ability to absorb ultraviolet radiation that is harmful to humans

Use of ressource:

- withdrawal of freshwater
- energy generation from both renewable and non-renewable sources
- depletion of minerals, fossil fuels and other non-living or “abiotic” resources that are non-renewable

Reuse of resources:

- mass of the product remaining at end of life
- ability to reuse the product’s components
- recycling of the product by recovering materials and energy

- **Product stage:** it represents the cradle-to-gate impacts of a tire, including the processes that provide the material and energy inputs into the product system, manufacturing of raw materials into the finished tire, and transport processes up to the factory gate, as well as the processing of any waste arising from the processes.

- **Mounting stage:** includes the activities from the tire factory to the final user, i.e., successive transport stages.

- **Use stage:** includes the activities covering the period from the handover of the tire until it reaches its end of life, including the fuel/energy consumption and related emissions attributable to the tire, and particle emissions related to tire and road abrasion.

- **End of life stage:** The end of life stage of the tire product starts when it is removed from the vehicle, does not provide any further operational function, and is at the end of the reference service life. It includes the transportation of the tire to the end of life treatment facility and the end of life treatment of tires being landfilled or incinerated without energy recovery.

(*) see UL PCR Tires: UL 10006 version 3.04 for any further details

ENVIRONMENTAL IMPACT CATEGORY

Europe (ILCD Method)	UNIT	TOTAL	PRODUCT STAGE: RAW MATERIALS	PRODUCT STAGE: TRANSPORTATION	PRODUCT STAGE: MANUFACTURING	MOUNTING STAGE: DISTRIBUTION	USE STAGE: TIRE IN USE	END OF LIFE STAGE: TIRE END OF LIFE TRANSPORTATION	END OF LIFE STAGE: TIRE END OF LIFE TREATMENT
Global warming potential	kg CO_2eq	2.09E+01	4.32E-01	5.27E-02	7.11E-02	3.66E-02	2.03E+01	1.14E-04	5.66E-05
Acidification potential	mol H+eq	7.27E-02	3.70E-03	7.17E-04	1.15E-04	1.43E-04	6.80E-02	3.96E-07	5.30E-07
Eutrophication potential (freshwater aquatic)	kg Peq	3.09E-04	2.00E-04	2.66E-07	7.47E-06	3.58E-07	1.01E-04	5.77E-10	2.35E-08
Photochemical ozone formation potential	kg NMVOCeq	6.63E-02	1.59E-03	4.61E-04	1.87E-04	1.46E-04	6.39E-02	3.73E-07	6.50E-07
Ozone depletion potential	kg CFC-11eq	3.78E-06	7.42E-08	9.41E-09	1.47E-08	6.69E-09	3.68E-06	2.10E-11	8.20E-12
Abiotic depletion potential	kg Sbeq	1.68E-05	1.19E-05	1.08E-08	4.25E-08	1.51E-08	4.79E-06	2.73E-11	2.50E-11

INDICATORS DESCRIBING RESOURCE USE

	UNIT	TOTAL	PRODUCT STAGE: RAW MATERIALS	PRODUCT STAGE: TRANSPORTATION	PRODUCT STAGE: MANUFACTURING	MOUNTING STAGE: DISTRIBUTION	USE STAGE: TIRE IN USE	END OF LIFE STAGE: TIRE END OF LIFE TRANSPORTATION	END OF LIFE STAGE: TIRE END OF LIFE TREATMENT
Total use of RENEWABLE primary energy	MJ	1.29E+00	3.67E-01	9.96E-04	5.22E-01	7.21E-04	3.98E-01	2.27E-06	1.73E-05
Total use of NON-RENEWABLE primary energy	MJ	3.16E+02	1.15E+01	7.73E-01	1.23E+00	5.52E-01	3.02E+02	1.72E-03	8.03E-04
Use of fresh water resources	$_m$3	1.03E-01	2.04E-02	1.79E-04	1.83E-03	1.48E-04	8.02E-02	4.57E-07	1.06E-06

INDICATORS DESCRIBING PARTICULATE EMISSIONS

	Unit per FU/DU	TOTAL
Particulate matter (PM10)	kg	8.39E-04
Particulate matter (PM2.5)	kg	2.58E-04

INDICATORS DESCRIBING WASTE AND RESOURCE RECOVERY

	Unit per FU/DU	TOTAL
Tire end-of-life treatment	kg	2.34E-01
Components for reuse	kg	0.00E+00
Materials for recycling	kg	1.23E-01
Materials for energy recovery	kg	8.90E-02
Exported energy (materials for energy recovery)	MJ	2.35E+00

EPD PROCESS CERTIFICATION	CONTACT	LCA AUTHOR	PROGRAMME OPERATOR
			
- Third party verifier: M. Damien PRUNEL LCIE BUREAU VERITAS 33, Avenue du Général Leclerc 92260 Fontenay aux Roses - France damien.prunel@bureauveritas.com **- Accredited by:** Recognized individual verifiers, approved by the International EPD® System.	**Manufacture Française des Pneumatiques MICHELIN** 23, Place des Carmes Dechaux 63040 Clermont-Ferrand Cedex 09 FRANCE For additional information related to the activities of the Michelin Group: www.michelin.com In regards to this environmental declaration, please contact: **Nicolas Beaumont**, Sustainable Development and Mobility department, nicolas.beaumont@michelin.com	**Nicolas Jeannoutot** nicolas.jeannoutot@michelin.com	**EPD® International AB** info@environdec.com **The International EPD® System** EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com

ANNEX

SLIDE 4 ON THE PATH TO REACH CARBON NEUTRALITY

GHG (Green House Gas) Protocol definition

(1) Carbon Neutrality : Having a net zero Carbon Footprint, or in other words, balancing the amount of carbon Emissions released into the Atmosphere with an equivalent amount of carbon removal, or simply eliminating carbon Emissions altogether.

(2) SCOPE 1 Direct GHG emissions occur from sources that are owned or controlled by the company, both stationary and mobile sources.
SCOPE 2 GHG emissions from the generation of purchased electricity, steam and heating/cooling consumed by the company

(3) SCOPE 3 emissions are a consequence of the activities of the company but occur from sources not owned or controlled by the company. These activities are organized into 15 categories, 8 of which represent the upstream value chain and 7 the downstream value chain.

(4) GHG A greenhouse gas (GHG or GhG) is a gas that absorbs and emits radiant energy within the thermal infrared range, causing the greenhouse effect. CO_2 is Greenhouse gas.

(5) Science Based targets Initiatives (SBTi) : The Science Based Targets initiative (SBTi) is a leading independent international organization which encourages participating companies to set greenhouse gas (GHG) emissions-reduction targets. SBTi Partners: UN Global Compact (UNGC) | CDP (Carbon Disclosure Project)|World Resources Institute (WRI) | WWF (World Wildlife Fund)

General Programme Instructions of the International EPD® System.
Version 4.0 | 2021-11-18

MICHELIN