Interview with OFI about TRWP

I – Policies and Commitments

1) What are the main characteristics of tire and road wear particles?

Tire and road wear particles (TRWP) are tiny debris generated by the friction between a tire in use and the road surface. They are the physical result of abrasion from a tire's grip on the road, which is essential for safe driving.

TRWPs have a number of characteristics, particularly their degradability, that distinguish them from the particles commonly known as microplastics, which result from the breakdown of larger plastic debris or are added to certain products in the form of microbeads.

- Composition: a mixture, in equal proportions, of tire tread fragments and road surface elements, such as minerals and road dust.
- Size: between 80 and 100 microns (about the diameter of a human hair) compared to an average 5 microns for microplastics.
- Density: 1.8 gr/cm^3, versus 1 gr/cm^3 for microplastics.
- Degradation speed: 50% seem to disappear within 16 months, compared with hundreds of years for plastic debris.

The generation of TRWP depends not only on tire design, but also on other factors that can worsen abrasion, such as driving practices, road surfaces, vehicle settings and tire pressure.

2) What is the Group doing to reduce the impact of these TRWP?

The Michelin Group is doubly committed to reducing abrasion:

- Individually, by reducing the abrasion of its own products:
  - by leveraging its materials expertise and a design culture/strategy focused on optimizing the use of raw materials and reducing their quantities
  - by working to define an ambitious target for reducing TRWP emissions from its tires in the coming years, which will be announced in 2021.
- Collectively, by collaborating with industry and public authority stakeholders to help introduce maximum abrasion limits, based on an appropriate test, and support deeper scientific understanding of TRWPs.

Michelin continues to carefully track the research being conducted worldwide that could serve to enhance current scientific knowledge.

3) In 2018, Michelin joined the Act4Nature initiative organized by the *Entreprises pour l'Environnement* association. At the time, Michelin's commitment focused on the "level of integration of materials' impacts on ecosystems into the life cycle assessments of new tires." How have you addressed the TRWP issue in assessing the impacts of end-of-life materials and products?

Michelin's commitment as part of the Act4nature initiative focused on **conducting a pilot project to determine the most appropriate, mature, state-of-the-art method for measuring the impacts on biodiversity and ecosystems of the raw materials used in making our tires.** This project was carried out in 2019 in partnership with the International Reference Center for the Life Cycle of Products, Processes and Services (CIRAIG), based at Polytechnique Montreal.

Following the pilot, Michelin now performs life cycle assessments (LCAs) on its raw materials, using the indicators that have proven most effective in measuring biodiversity impacts (land use, climate change, water scarcity, etc.), and systemically integrates the findings into new product LCAs.

As for the **"level of integration of impacts"** mentioned in the commitment, it corresponds to the number of product **life cycle assessments performed** that integrate the findings of the raw materials LCAs divided by the total number of product LCAs, and **not an impact ratio.**

However, we take TRWPs into account in the product LCAs. (see the answer to question 6)

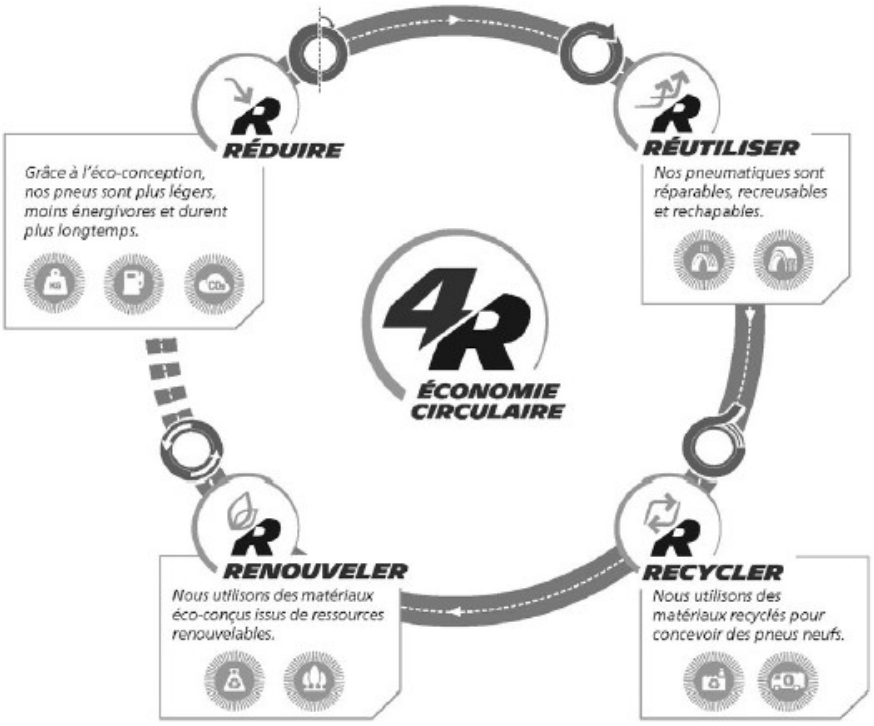
The Michelin Group is committed to using 100% sustainable, biosourced or recycled raw materials by 2050. That's why assessing the environmental impacts of its raw materials, particularly biosourced materials, is a priority.

Measuring a company's biodiversity footprint is a major challenge because effective yardsticks are still being developed. For example, Michelin participated in the program led by Caisse de Dépôts to design the e-Global Biodiversity Score and is currently working with the Laboratory organized by WWF and the AgroParisTech Chair of Environmental Accounting to choose a robust sustainability method from among the three proposed by the Laboratory: SBTN, Care-TLD and One Planet Approach.

4) On page 136 of the 2019 Universal Registration Document, Michelin says that it "makes every effort to attenuate the impact of its products on the environment." What about plastics?

a. Have they been designated as a priority issue?

Plastics are part of the more global issue of the circular economy, which the Group diligently addresses through a holistic, systematic approach, structured around the 4Rs:



The main risks associated with our products are discussed on page 195 of the 2019 Universal Registration Document. **Plastics were not identified as one of these risks because they represent only 8% of total process waste.** This waste is recovered and reused, mainly as fuel for energy recovery but also as recycled materials when such channels exist and the waste is not hazardous. **Michelin is proud that a full 96.9% of all waste is recovered and reused as materials or fuel, with 56 of 78 production facilities recovering more than 95%.**

b. Has this been discussed in the governance bodies?

In normal business conditions, the **Circular Economy Committee**, which operates under the aegis of the Group's Environmental Governance Body (itself chaired by two members of the Executive Committee), identifies emerging issues concerning raw material inputs, waste, etc. and addresses them in a circular economy approach. For example, the Committee deals with the issue of plastic packaging for two-wheel tire products in Asia.

c. Is there a person or unit in your organization responsible for its plastic footprint?

While there is no unit specifically responsible for the plastic footprint, since June 2020 a **Supervisory Board Corporate Social Responsibility Committee (CSRC)** has been tasked with reviewing the Group's sustainable development strategy and commitments and issuing recommendations as needed.

d. How often were TRWP issues discussed in your sustainable development committees during the past year?

TRWPs are one of the issues discussed with the Stakeholder Committee, which was set up in 2016 with 12 members representing the Group's main stakeholders, including suppliers, investors, unions, customers and NGOs. It meets with the Executive Committee for a full day at least once a year. At its latest meeting, in October 2020, the Group's challenges, initiatives and commitments with regards to TRWPs were discussed, providing ample opportunities to share views and recommendations.

5) Does your organization have a strategy for identifying and targeting which of your products release the most TRWPs during use? Do you have an internal tracking system? If so, can you describe the frequency of controls and the method used?

Today, there is no standardized method for measuring TRWP emissions. This is why the European Tyre & Rubber Manufacturers Association (ETRMA) is working to define such a method for measuring a tire's abrasion rate under average European conditions of use (in grams of particles emitted every 100 km) and sharing its findings with the European Commission. The Commission is now deliberating whether to use such a method for regulatory purposes during its current term (2019-2024). Until then, Michelin will continue to track this performance based on its expertise and testing by third parties such as DEKRA and TUV.

6) Michelin's medium and long-term strategy is to focus on moving upmarket, using more biosourced materials and its 3D printing capabilities, and developing puncture-proof tires. How do these objectives fit with your strategy for attenuating your environmental impacts, including TRWP?

Our strategy for reducing our environmental impacts is informed by several pathways to improvement. The circular economy, as illustrated by our 4Rs: Reduce, Reuse, Recycle and Renew. The Reduce "R" represents one of Michelin's most effective ways forward, led by our proficiency in tire design and materials. This is what enables us, year after year, to reduce the weight of material in our tires while

improving their performance. Between 2010 and 2020, we drove a 10% improvement in this indicator, which measures the weight of materials required to deliver our trademark grip, noise, rolling resistance and wear resistance performance.

This approach fits seamlessly with the other R's in our 4R approach.

II – Management systems and initiatives

7) Michelin's life cycle assessments (2019 URD, p.176) show that the in-use phase could account for between 70% and 95% of a tire's environmental impacts.

   a. How do you define these impacts?

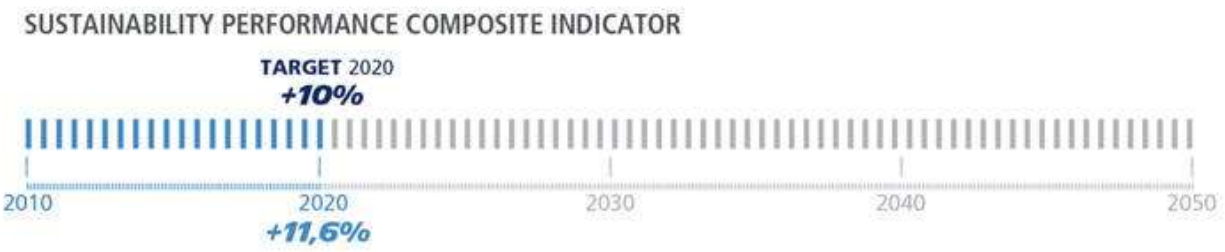
   In the URD, these environmental impacts are expressed as a single score calculated based on the standardization and weighting method used in a number of environmental indicators developed by the European Commission for the Product Environmental Footprint (PEF) method.

   b. How do you factor TRWP into these impacts?

   Tire and road wear particles (TRWPs) are currently measured in one of these indicators, called "particulate matter," which tracks TRWP releases into the air. The method for measuring them is derived from the analyses conducted by the Tire Industry Project (TIP) as part of the Product Category Rules (PCR) used in life cycle assessment calculations.

8) What policies are in place to encourage eco-design or upgrades in the design of Michelin products to reduce their TRWP emissions?

Since Michelin was founded, the concern for innovating to deliver continuously improved performance while limiting the use of raw materials and reducing a tire's impact has been an integral part of our corporate DNA. In other words, independently of any outside studies, one of the key goals of Michelin research is to hone the proficiency in tire design and materials that enables us, **year after year, to reduce the weight of material in our tires while improving their performance**. Between 2010 and 2020, we drove a 10% improvement in this indicator, which measures the weight of materials required to deliver our trademark grip, noise, rolling resistance and wear resistance performance.



9) In 2017, Michelin unveiled *Vision Concept*, a 3D-printed, recyclable, biodegradable tire that it says represents the future of tires. The Group is now emphasizing its 4R concept: Reduce, Reuse-Repair-Retread, Recycle and Renew.

a. How can the 3D printing process be more widely deployed?
b. When are you planning to convert your tire ranges to *Vision Concept*-style models?

3D printing is a means to an end, not an end in itself. It is used to "recharge" the concept tire's tread, but it is still **too soon to announce when we will be able to 3D print rubber.**

c. Does *Vision Concept* eliminate TRWPs?

By using only a thin layer of wearable rubber that can be restored more often, we can directly attenuate two sources of a tire's direct or indirect emissions: First, the vehicle's CO_2 emissions, because the thinness of the rubber layer helps to optimize the tire's rolling resistance. **Second, TRWP emissions, because there is less abrasion with the same amount of material when it is thinner.** Lastly, more frequent recharging means that the wearable layer is more suitable (and therefore more optimized) for the tire's current conditions of use, as opposed to average conditions.

10) What are the initiatives underway in your company to reduce the environmental impact of TRWPs?

As illustrated by *Vision Concept*, Michelin is committed to **ensuring that every component in its tires is sustainable.**

To do so, the Group is leveraging its advanced technological maturity in high-tech materials and its own technology incubator.

Around the world, more than 6,000 people in the Group – engineers, researchers, chemists and developers – are **working hard to fulfill Michelin's commitment to making its tires 100% sustainable by 2050.**

One example is the **BioButterfly project**.
Production of butadiene from biomass, such as waste wood, rice husks and corn stover. The project is the focus of a dedicated program that the Group is conducting in partnership with IFPEN and Axens with the support of France's Agency for the Environment and Energy Management (ADEME). It is designed to produce butadiene using ethanol derived from biomass to replace petroleum-derived butadiene. Alongside styrene, butadiene is a key component in the synthetic rubbers used to make tires. Ultimately, 4.2 million tonnes of wood chips could be integrated into Michelin tires each year.

11) What are the technical and practical challenges preventing you from using only natural rubber?

It might seem ideal to completely eliminate synthetic rubber (SR) from the components used to make tires, since it is derived from petrochemical feedstocks, and to use only natural rubber (NR), which is fully renewable and carbon neutral.
But this idea is based on a false premise, as **NR cannot fully replace SR** for a number of reasons:

1. **Technical reasons**. NR and SR contribute different, yet interacting, technical, mechanical and thermal components to the "recipe" used to make each tire model. The percentage of SR in the mix varies depending on the tire's complexity and size (the larger the tire, the greater the

percentage of NR). In theory, a tire could be made entirely from either SR (as was the case during World War II) or NR (as some tire manufacturers have done, as a demonstration), but in both cases, **the resulting loss in performance (wear, noise, grip, rolling resistance) makes the exercise meaningless.** Moreover, some SR components are residual chemicals; eliminating the use of SR would not eliminate an equivalent amount of petroleum products.

2. **Above all, and paradoxically, environmental reasons**. Replacing SR with NR would spur a **huge increase in global NR demand, which would inevitably put much more pressure on land and lead to the risk of massive deforestation**. Global NR output stands at about 13 million tonnes and requires 13 million hectares of rubber trees. Per-hectare productivity is improving by around 1-2% a year, so if we had to double NR output tomorrow, there is no way that today's farms to would be able to supply it. We'd need to find at least 10 million hectares of land in tropical regions (after all, rubber trees can't grow just anywhere, which is why 90% of production comes from South-East Asia). The land would have to be either taken from other crops (by planting rubber trees instead of cocoa trees or rice, for example) or cleared from still intact tropical forests. In fact, this is exactly what happened between 2005 and 2012. As growth in the number of automobiles worldwide, before the financial crisis, drove an increase in global NR demand, NR prices rose from $2.00 a kg to $6.50 a kg. In turn, this encouraged farmers – 85% of whose farms are small, family-owned plots of less than 3 ha – to clear massive amounts of forestland. The slowdown in demand, combined with the subsequent increase in supply (with a seven-year delay, since it takes that long for a rubber tree to start producing) then caused prices to fall, from $6.50 to $1.20 a kg today, and reduced revenues across the industry. In fact, today, many farms are no longer being harvested. Hundreds of thousands of forest hectares have been destroyed due to the instability of demand and prices. And millions of farmers have suffered the economic consequences.

As a result, NR should be substituted for SR **whenever it is technically, financially and environmentally feasible, but not systematically, and certainly not suddenly and without proper management**. The adverse effects would be more serious than the theoretical environmental benefits.

12) How does the Michelin Group address sustainability and the reduction of its environmental impacts as it expands in the functional economy?

A functional economy business model is **much more conducive to the kind of innovation that extends product lives, as is already the case with our retreadable and retreaded Truck, Aircraft and Earthmover tires**. Product owners are looking for a number of performance features in their tires, including casing endurance (i.e. its ability to last several lifetimes), wear life and the amount of material used to make them. In a functional economy, the product owner is often the product manufacturer. **That's why this is going to encourage innovation to make products that deliver performance designed to last.**
Our approach can be seen in such innovations as Infinicoil technology, which extends the life of Truck tires, the MICHELIN NZG Aircraft tire, and the progressive tread patterns on the MICHELIN Premier A/S, CrossClimate and Primacy4 ranges.

13) According to the 2019 URD, p.136, "Michelin is prepared to work with authorities, in close cooperation with the entire industry, to further deepen our understanding and abate TRWP [microplastics] emissions by developing maximum limits based on a standardized abrasion method."

a. Can you define what you mean by "standardized abrasion method"?

The most effective way to assess this **phenomenon is to measure the amount of abrasion, expressed as grams of mass lost per 100 km**, which approximates the contribution of a given tire to global TRWP emissions.

So far, there is no **standardized method for measuring abrasion**. However, the tire industry is currently working closely with the European Commission to:

- Identify the most appropriate testing method to assess the rate of car tire abrasion (measured in g/100 km)
- Assess the **feasibility of the testing method and its implementation schedule**
- **Develop and test the method**
- **Validate the method** and its parameters

The selected method should be:

- Repeatable, reproducible, efficient and practical
- **Representative of actual use on European roads**
- Aligned with **regulatory use** (including market oversight)
- Potentially usable by all tiremakers around the world

b. Are these tests conducted independently and in conditions that reflect actual situations?

c. How will the method help to limit emissions?

Regulatory tests have to be conducted in the proper conditions if we want to make the right decisions for the environment. **To effectively reduce particulate emissions from tires, we need to define a test that is representative of actual use** (type of road, type of driving, type of vehicle, etc.).

The final decision on the choice of testing method and its implementation for regulatory purposes naturally lies with the European authorities, who guarantee the neutrality of the approved method. Insofar as the industry is working to recommend a method for regulatory purposes, **the resulting tests will most likely be supervised by the authorities, as is the case today for other performance features, to make sure that they are conducted independently and that the results are credible**. Moreover, as with any European regulation, the Member States are responsible for designating **market oversight authorities**, which conduct regular inspections to ensure product compliance.

14) Michelin is an active member of the Tire Industry Project (TIP), which brings together the eleven largest tiremakers in a commitment to identifying the potential human health and environmental impacts of tires throughout their lifecycle.

a. Are you working with them to develop solutions to the TRWP issue?

The TIP has been supporting research on tire and road wear particles since 2005. In 2020, to mark the 15th anniversary of the Tire Industry Project, TIP made most of its **peer-reviewed research** available free of charge, and will aim to do so for all future studies into TRWP. The

papers covered such aspects as the measurement of **airborne concentrations of TRWPs, the distribution of TRWPs in the environment and their acute aquatic toxicity**.[1]

b. What are your R&D projects to eliminate or reduce TRWP releases from your products?

In 2019, the CEOs of the TIP member companies approved a 2020-2021 work program that will include numerous **research projects studying TRWP, including extended sampling of TRWP presence in different environmental compartments** (rivers, soil, estuaries), **analyzing the degradation of TRWP, modeling TRWP fate in the environment and investigating the potential health impacts on organisms from long-term exposure to TRWP**.[2]

15) Michelin has invested in partnerships with Carbios and Pyrowave to develop green alternatives to tire production and recycling processes. Do you address TRWP issues in your collaborative ventures?

These ventures are not directly related to tire wear particle emissions. They are focused on developing technologies and processes capable of recovering consumer waste for reuse as tire raw materials. Obviously, this would prevent some of the waste from ending up in the natural environment, but it wouldn't have any impact, either positive or negative, on the TRWP emission rates of our products. On the other hand, these ventures will naturally deliver overall benefits as they enable us to integrate more sustainable materials into our tires while maintaining positive life cycle assessments. In this way, they can be led alongside our materials management programs.

One example is the **production of regenerated styrene from waste polystyrene** (yogurt pots, food containers, plastic packaging, etc.). In an innovative process developed by partner company Pyrowave, microwaves are used to break down polystyrene objects in order to recover their original building block: styrene.

This recovered styrene can then be used to make new packaging or manufacture new products from recycled plastics in the automotive, home appliance and tire industries. Styrene is a key component in the synthetic rubbers used to make tires.

The equivalent of 80,000 tonnes of polystyrene waste could be recycled into MICHELIN-brand tires every year.

Another example is the **production of regenerated textiles from PET plastic waste** (plastic bottles used for water, juice, cooking oils, dishwashing liquid, etc.).

Using a revolutionary process developed by partner company Carbios, PET objects are broken down by enzymes into their building block monomers, which can then be reused to make new objects, enabling infinite recycling. One of these objects is the polyester yarn used in tire manufacturing.

Close to four billion plastic bottles could be recycled in Michelin tires each year.

[1] https://www.wbcsd.org/Sector-Projects/Tire-Industry-Project/Resources/Tire-Road-Wear-Particles-Papers
[2] https://www.wbcsd.org/Sector-Projects/Tire-Industry-Project/News/Meeting-sees-CEOs-greenlight-TIPs-2020-2021-work-program

16) In their tenders, do your OEM customers mention criteria for reducing TRWP emissions from your products? Do their specifications include a request to track these releases?

We try to answer every customer query regarding abrasion and TRWP issues. **These concerns are addressed as part of our technical and product development relationships**.

17) The UK James Dyson Award was recently won by a solution to equip tires with a suction system that could reduce airborne wear particle emissions by up to 50%. The recovered rubber debris could be recycled or reused. Where does Michelin stand on this type of innovation?

The tire industry, through its representative British association, is in **talks with the Tyre Collective** [which invented the system]. Naturally, we are looking at this initiative, which is still in its preliminary phase and **needs to be demonstrated outside the laboratory**. We should point out that the system is based on the electrostatic capture of the particles rather than suction.
We are also **tracking progress on other initiatives**, such as the ZEDU-1 project by DLR (Deutsches Zentrum für Luft- und Raumfahrt or German Aerospace Center) based on optimized aerodynamics and a suction system.

18) For 2020, Michelin had set the target of using 30% renewable or recycled materials in making its tires (vs. 26% in 2018). Was this commitment met, despite the current crisis? What is your objective for 2025?

In 2020, the percentage of sustainable materials in Michelin products came to 28%, which was very close to the objective. But 2020 was a special year, whose circumstances prevented us from meeting the entire target. The Group recently announced that by 2050, **MICHELIN tires will be 100% made from renewable, recycled, biosourced or otherwise sustainable materials**.
An objective being met with powerful R&D capabilities….

Michelin's maturity in materials technology stems from the strength of its R&D capabilities, which are supported by 6,000 people working in seven research and development centers around the world and mastering 350 areas of expertise. The commitment of these engineers, researchers, chemists and developers has led to the filing of 10,000 patents covering tire design and manufacturing. They work hard every day to find the recipes that will improve tire safety, durability, ride and other performance features, while helping to make them 100% sustainable by 2050.
….and bold partnerships with innovative companies

Michelin is also aware that the speed and nature of innovation requires new forms of cooperation, which is why it has forged partnerships with innovative companies whose advances offer unlimited prospects. The developed technologies go well beyond the world of tires and could be used in other industries, enabling them to benefit as well from recovered raw materials that are infinitely reusable. These technologies will also make it possible to recycle polystyrene and recover carbon black or pyrolysis oil from used tires.

Since 2019, Axens and IFP Energies Nouvelles, the two companies spearheading the **BioButterfly project, have been working in cooperation with Michelin on the production of bio-butadiene**** to replace petroleum-based butadiene. Using the biomass from wood, rice husks, leaves, corn stalks and other plant waste, 4.2 million tonnes of wood chips could be incorporated into Michelin tires every year.

Formed in November 2020, the partnership between **Michelin and Canada-based Pyrowave** is able to produce **recycled styrene** from plastics found in packaging, like yogurt pots and food trays, or in insulating panels. Styrene is an important monomer used to manufacture not only polystyrene but also synthetic rubber for tires and a wide variety of consumer goods. Eventually, several tens of thousands of tonnes of polystyrene waste could be recycled into new plastic products and Michelin tires every year.

The revolutionary process developed by **French startup Carbios uses enzymes to deconstruct PET*** ** plastic waste into its original pure monomers, which can be infinitely recovered and reused to make new PET plastics. One of these recovered plastics just happens to be the polyester yarn used in tire manufacturing. Some four billion plastic bottles could potentially be recycled into Michelin tires every year.

Lastly, in February 2021, the Group announced plans to build its first tire recycling plant in the world with Enviro, a Swedish company that has developed a patented technology to recover carbon black, pyrolysis oil, steel, gas **and other new, high-quality reusable materials from end-of-life tires. It will enable everything in these scrap tires to be recovered and reused** in several types of rubber-based production processes.

Michelin also supports the circular economy, as attested by its participation in the European **BlackCycle** consortium. This project, which is coordinated by the Group and financed by the European Union, brings together 13 public and private-sector partners to design processes to produce new tires from end-of-life tires.

19) Concerning the issue of recycling and retreading worn or end-of-life tires:

a. What is the connection between your recycling processes and your tire retreading technologies?

Retreading is a **remanufacturing process that replaces the tread on worn tires, using the same casing, to extend their useful lives by up to three times.** It is a regenerative process that extends a tire's useful life, thereby delaying its entry into the waste stream and delivering benefits to both the customer (the same high performance at a fraction of the cost of a new tire) and the environment. These environmental benefits were assessed in a 2015 report commissioned by Michelin from the EY consulting firm.[3]

b. Can you describe the policies and objectives in place to limit your environmental impacts? Can you give us some key figures?

Compared with a non-retreaded or entry-level model, a retreaded truck tire delivers reductions of:

- **70% in the use of oil and other extracted raw materials**, mainly by avoiding the use of new steel for the casings;
- **29% in the use of rubber tree farm land**;
- **24% in CO_2 emissions**;
- **19% in water use**;
- **50 kg of raw materials by weight.**

[3] https://pdfslide.tips/documents/ey-limpact-socio-economique-du-rechapage-poids-termes-deconomie-de-matiere.html

c. Is retreading and regrooving waste recovered and reused? If not, how is it managed?

Mold-cured retreading, the most commonly used process in Europe, **produces two types of "waste"**:

1/ **Detreading strips and powders**

Powders and strips are recovered and reused in new materials, currently by outside service providers.

- The powders are used to make industrial rubber products.
- Most of the strips are devulcanized and used to produce regenerated rubber.

2/ **Non-compliant tires**

Tires that cannot be retreaded are sent to the same recovery and reuse channels as end-of-life tires:

- Granulation and reuse in industrial rubber products.
- Burned as fuel to recover heat and power.

In general, with the exception of tires, retreading waste is recovered and reused as raw material, mainly in a long loop and currently by outside service providers.

20) You have said that 88% of all MICHELIN-brand tires are recycled (2019 URD, p.176). Which recycling channels or processes does Michelin use? What happens to the other 12%? How do you plan to reach a 100% recycling rate?

A 2019 study conducted by Deloitte for the TIP showed that **88% of all end-of-life tires, regardless of brand, sold in the 45 countries under review were collected and the majority of them were recovered and reused[4].**
According to this same study, of the total tire tonnage brought to market by Michelin in 2019 in those countries, an estimated 76% was recovered and reused, of which 43% as material, 29% as fuel and 4% in earthworks.

Collectively, Michelin is involved in end-of-life tire recycling channels through its active membership in a variety of organizations, including:

- The Tire Industry Project (TIP), in a commitment to deepening knowledge of collection and treatment systems and to supporting local recyclers;
- Industry associations, to ensure that end-of-life tires are properly collected and processed, **thereby demonstrating Michelin's support for the concept of extended producer responsibility.**
- The recycling industry, to foster the recovery of material from tires and other end-of-life rubber products for reuse in tire and non-tire applications.

Individually, the Group is also capitalizing on its tire and materials expertise **to invest in the development of end-of-life tire recovery and reuse solutions.**

[4] https://www.wbcsd.org/Sector-Projects/Tire-Industry-Project/End-of-Life-Tires-ELTs

- In 2017, **Michelin acquired Lehigh Technologies**, a US company specializing in the design and **production of micronized rubber powders derived from recycled end-of-life tires and other rubber-based industrial products.**
- In April 2020, the Group announced a partnership with Swedish company **Enviro to develop and mass produce a highly innovative pyrolysis technology** that recovers high-quality products like carbon black, pyrolysis oil, steel and gas, which can then be re-incorporated into the production cycle of various industries.
- **More recently, in February 2021, the Group announced plans to build its first tire recycling plant with Enviro.** Based in Chile's Antofagasta region, the plant will be able to recycle 30,000 tonnes of earthmover tires a year, or nearly 60% of such tires scrapped every year nationwide. Work will begin in 2021, with production scheduled to get underway in around 2023. More than $30 million will be invested in building Michelin's first new-generation end-of-life tire processing plant.
- Lastly Michelin is also working on new end-of-life tire recovery and reuse solutions as part of its innovation drive. Since May 2020, for example, the Group has been coordinating the **BlackCycle** project as part of Horizon 2020 – the EU Framework Program for Research and Innovation. It brings together seven industrial partners, five Research & Technological Organizations (RTOs) and an innovation cluster as part of a European consortium in five countries. **It aims to establish a circular tire economy by designing one of the world's very first processes to make new tires from end-of-life tires.**
- Michelin is also involved in plastics recycling and other recycling channels.

III – Performance indicators and outcomes

21) What indicators do you use to measure TRWP emissions from your tires? Have you estimated the impact of your products? Can you describe what has been done to foresee or correct the influence of external variables on microplastics emissions (has Michelin identified the impact of these externals unrelated to tire design)? *A **study commissioned by the European Commission** showed that the tire industry tended to emphasize external factors, such as driving practices, vehicle speed and weather conditions (rain, heat) rather than tire design.*

Like the rest of the tire industry, Michelin takes this issue very seriously, as evidenced by our involvement in the TIP, the research conducted over the past 15 years, and our active collaboration with European authorities in developing an abrasion test.
TRWP emissions are the physical result of the friction from a tire's grip on the road, which is essential for safe driving. and which can be worsened by other factors, such as driving practices, road surfaces, vehicle settings and tire pressure. **This does not in any way deny the responsibility of tiremakers but simply reflects the complexity of a physical phenomenon, which is why the issue of TRWPs requires a holistic approach**. It was this reality that prompted the European tire industry, via its representative association, **in 2018 to initiate a multi-stakeholder European TRWP Platform**,[5] with the participation of European Commission representatives, to pursue three main objectives:
- Share scientific knowledge,
- Achieve a common understanding of the possible effects,
- Identify possible pathways to mitigating emissions and co-design solutions

[5] https://www.csreurope.org/trwp, Scientific Report: https://www.csreurope.org/s/Scientific-Report-on-Tyre-and-Road-Wear.pdf, Activity Report: https://www.csreurope.org/s/TRWP_-Way-Forward-Report.pdf

22) Michelin's 2019 URD refutes the accusation that abrasion particles are toxic to aquatic environments. How did you assess the toxicity of these particles and in what conditions was this research conducted?

The studies commissioned by ETRMA and published in peer-reviewed scientific journals found that TRWPs are **unlikely to have any harmful effects on human health and the environment**. However, the TIP recognizes the importance of **pursuing further research into the potential impacts of TRWP**, in particular to improve our understanding of the **potential effects of chronic exposure to TRWP**. Findings from a study on the chronic toxicity of tire and road wear particles to water- and sediment-dwelling organisms, as well as earlier studies demonstrating the lack of acute toxicity of **TRWPs, indicate that under typical exposure conditions, TRWPs in sediment poses very little risk of toxicity to aquatic organisms**. **These studies are all public and available on the TIP website.**

In addition, Michelin continues to carefully track all of the research being conducted worldwide that could serve to enhance current scientific knowledge.

23) Can you tell us the total tonnage of synthetic rubber used last year?

We cannot disclose such information for reasons of confidentiality.

24) To what extent have you reduced or eliminated the release of microplastics from your products?

We are currently unable to answer that question for reasons of confidentiality.