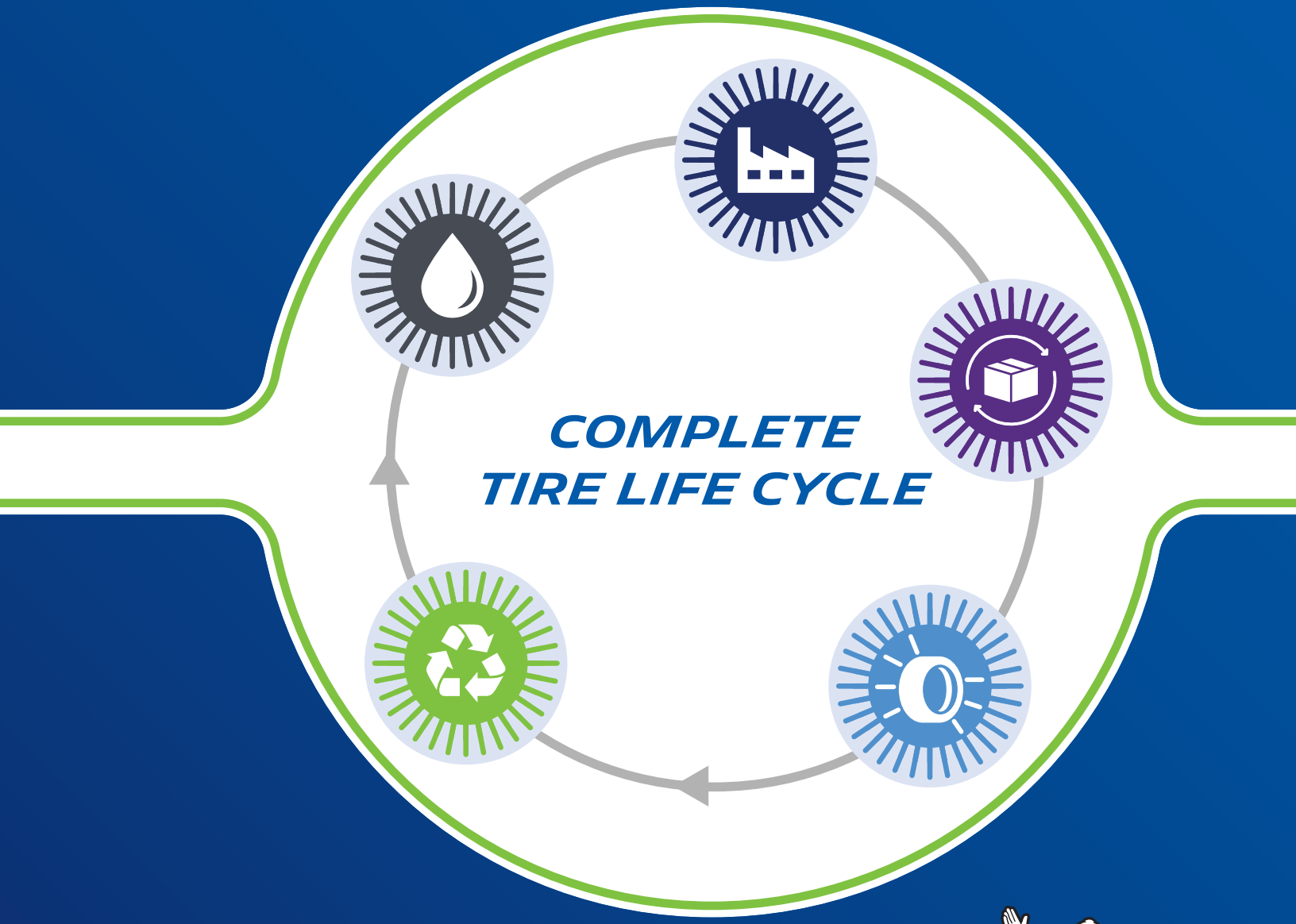
LIFE CYCLE ASSESSMENT

ENVIRONMENTAL IMPACT OF MICHELIN TIRES AT MINE SITE IN CHILE, SOUTH AMERICA



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THROUGH THE USE OF LIFE CYCLE ASSESSMENTS, MICHELIN MINING UNCOVERS OPPORTUNITIES TO REDUCE CUSTOMERS' CO_2 EMISSIONS AND HELP LEAD THE TRANSFORMATION OF MINING TO A MORE SUSTAINABLE FUTURE.

Tires have a significant impact on a mining vehicle's total fuel emissions. Energy efficiency and proper use of mining tires hold the greatest opportunity to reduce their environmental impact in the mine while helping the mine reduce cost and emissions. Michelin uses Life Cycle Assessments to gather insights that equip our tire designers and engineers with data needed to continually evolve and innovate products, services and solutions that advance sustainable mining.

THE OPPORTUNITY

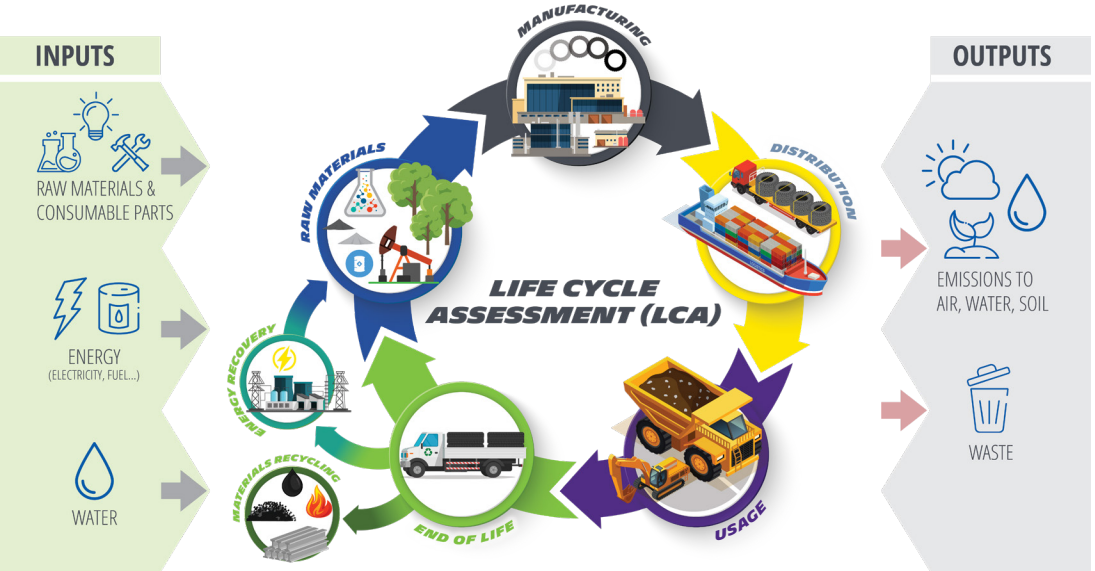
The world is facing many large-scale, urgent challenges that impact human wellbeing and environmental health – global warming, overuse of natural resources, biodiversity loss, mass migrations and poverty. Responsible companies understand their role in building a more planet-friendly future and are working toward decarbonization and sustainable development. Reality is that, in most instances, more sustainable means more metals and minerals, which puts pressure on the mining industry to mine more responsibly and minimize the industry's environmental and social impact.

For more than 30 years, the Michelin Group has been committed to reducing its environmental and social impact. That commitment extends to our role as a supplier to the mining industry. We aim to develop products, services, solutions and support that help mines be safer, smarter and more sustainable.

THE APPROACH

Michelin uses Life Cycle Assessment (LCA) methodology, in accordance with ISO 14040, to analyze the environmental impact accumulated during our products' life cycle from raw materials to end-of-life treatment. Used extensively by OEMs and the transport sector, LCAs help Michelin gather insights through data that drive advancements in product design with the intent of improving environmental impact without compromising performance. Each stage of the life cycle is assessed according to 16 environmental impacts.

LCAs begin by identifying the functional unit, which defines the primary functions of the given product or service that will be assessed. Once the functional unit is defined, data on all inputs is collected. This collection starts at the extraction of raw materials, manufacturing, and use, to the end of life, taking into account all transport steps. After data collection, Michelin uses specialized software to calculate the outputs across the product's life cycle. Michelin uses the LCA method based on guidance from the European Commission (EF3.0) to calculate the 16 environmental impacts.



BY 2030, 100% OF MICHELIN'S NEW PRODUCTS WILL UNDERGO LIFE CYCLE ASSESSMENTS TO ENSURE CONTINUAL IMPROVEMENT IN ENVIRONMENTAL IMPACT.

ROLLING RESISTANCE + MOTION RESISTANCE FOR MINING

Cars run on hard surfaces → 100% Rolling Resistance

Mining trucks run on hard and soft surfaces.

On soft surfaces, tires sink in the soil and energy is necessary to propel the truck forward. That's motion resistance, which is equally important to measure for energy efficiency.

REAL-WORLD SCENARIO: COPPER MINE IN CHILE

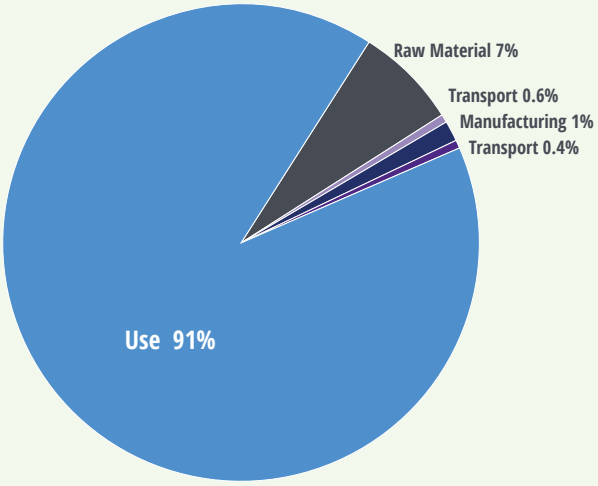
Tires have a significant impact on a vehicle's overall energy efficiency. Rolling resistance, an essential measurement of energy efficiency, measures how much effort a vehicle exerts to make its tires roll. In an environment with soft, non-paved surfaces like a mine, it is important to also consider motion resistance, which measures the interaction between tires and the road on which they drive.

Working with a mine site in Chile, Michelin used Life Cycle Assessment (LCA) methodology to measure 53/80R63 MICHELIN® XDR®3 tires on 54 vehicles with an average payload of 250 tons. The vehicles ran an average speed of 18 km/h. The functional unit for the LCA was tires equipped on RDT fleets in a copper mine in Chile that enable the fleet to move 1,825 M tkm, which is the annual production of the mine. Michelin wanted to identify potential environmental improvement areas — without any compromise in performance — and compare the potential environmental impact of different tire designs.

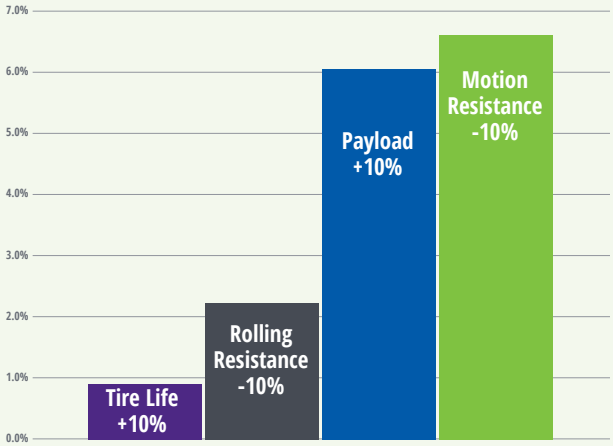
THE RESULTS

After collecting all inputs and outputs and calculating the environmental impact through specialized software at each life cycle stage, Michelin discovered that 91% of the environmental impact of its mining tires at the mine in Chile occurred during the use phase. Using a sensitivity study, Michelin then explored four different scenarios to improve tire design — increase tire life by 10%, increase the tire's ability to carry 10% more payload, decrease the tire's rolling resistance by 10%, and/or decrease the tire's motion resistance by 10%.

The results clearly showed that decreasing the tire's motion resistance and increasing its carrying capacity (10% more payload) had the most impact on improving the tire's environmental performance. Decreasing motion resistance makes the tire more energy efficient, which improves the vehicle's fuel efficiency, helping the mine reduce cost and overall emissions. Further, designing tires to carry more payload helps mines achieve the same level of production with fewer trucks, resulting in lower CO_2 emissions and fuel consumption.



Environmental Impact Occurring at Each Stage of Life Cycle



Results of Sensitivity Study to Measure Environmental Impact of Different Tire Design Modifications

HOW IS MICHELIN USING THESE INSIGHTS TO BUILD MORE SUSTAINABLE PRODUCTS?

Michelin continually pursues innovative product design and development to maximize mining vehicle's productivity and energy efficiency. Our latest tire innovations like the MICHELIN® XDR® 4 EXTRA LOAD tire enable customers to haul heavier[1] loads, while the XDR® 4 SPEED+ MD and XDR® 4 SPEED MC tires help customers to carry loads faster[2], without compromising tire life.[3] This year, Michelin introduced the first radial construction designed to boost productivity of the world's largest wheel loader. The 70/70R57 MICHELIN X MINE L4** radial tire delivers improved mobility and productivity thanks to three times the tramming speed of the competitor tire[4] and is expected to achieve overall tire life increase of 50% of more versus competitor[5].

EMPOWERING CUSTOMERS TO ACHIEVE THE SAME LEVEL OF PRODUCTION WITH FEWER TRUCKS REDUCES COSTS AND CARBON EMISSIONS.

Disclaimers:

(1)The MICHELIN® XDR®4 EXTRA LOAD 59/80R63 tire gets 10% more load capacity to carry up to 115 Tons, due to new cables, architecture and larger size.

(2) The MICHELIN® 50/80R57 XDR® 4 SPEED + MD tire offers the HIGHEST TKPH on the market, 1,822 TKPH. This significantly exceeds the BRIDGESTONE® 50/80R57 MASTERCORE® VREV® E3A tire with 1,333 TKPH.[1]

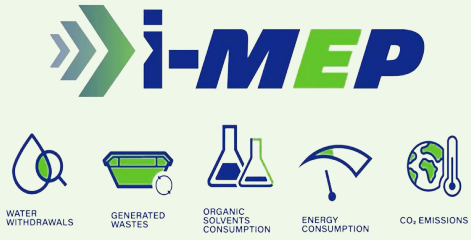
(1) TKPH figures from Michelin 2019 Databook and Bridgestone 2021 Databook. Actual site TKPH will vary based on many factors, including cycle distance, temperature, and load conditions.

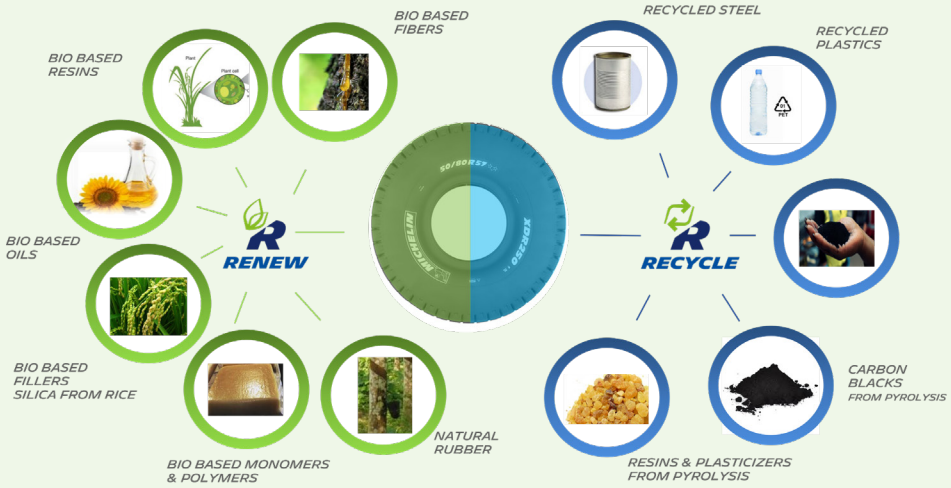
(3) The new MICHELIN® 50/80R57 XDR® 4 SPEED MC tire PROVIDES EXCEPTIONAL TIRE LIFE with an INCREASE of A MINIMUM of 7% additional tire life.[1]

(1) Compared to MICHELIN® 50/80R57 XDR® 250 C tire, based on average projected performance by mine site. Actual results may vary.

(4) Based on the Firestone® Technical Bulletin reference number BATO-OTR-TB-002-160719 , using Ambient 38° C and greater than (>) 5km tramming distance for the 70/70-57 Firestone® SRG DT LD L4 bias ply tire at 4 km/hr. compared to the 70/70R57 MICHELIN® X MINE® L4 ** tire which demonstrated three times the tramming speed at 12 km/hr. Actual results may vary.

(5) Based on field engineering reports on wear rate of the 70/70R57 MICHELIN® X MINE® L4 ** tires versus the 70/70-57 Firestone® SRG DT LD L4 bias ply tires in comparable working conditions. Actual results may vary.





REDUCING ENVIRONMENTAL IMPACT AT EVERY STAGE

Michelin's commitment to the planet extends beyond tire design. We aim to reduce our environmental impact at every stage of the life cycle. In 2005, Michelin introduced the Michelin Environmental Footprint (MEF) to measure the impact of our manufacturing processes. Since its inception, we have reduced the environmental impact of our manufacturing by 50%. In 2021, we evolved MEF to i-MEP (Industrial Michelin Environmental Performance) where we monitor and control water withdrawals, amount of waste generated, use of organic solvents, energy consumption and CO_2 emissions from manufacturing. Our i-MEP target is to reduce the impact by one-third by 2030 as compared to 2019.

Michelin also has laid out a sizeable challenge to integrate 100% renewable or recycled materials into our tires by 2050. Using our expertise in high-tech materials, we are laying a roadmap to full circularity by 2050 without compromising the quality or performance of our tires. Finally, Michelin is actively pursuing end-of-life tire solutions and has established recycling project teams on three continents: South America, South Africa and Australia. This year, Michelin will open its first tire downsizing facility in Chile, South America.

THE CONCLUSION

As an industry, we face many of the same challenges. The mining sector is experiencing a growing demand for metals and minerals that support the energy transition, while needing to minimize the impact of its operations on people and the planet. Michelin has anchored an "All-Sustainable" approach into our growth strategy, aiming for balanced development between people, economic & financial performance, and the planet.

We use date-driven Life Cycle Assessments (LCA) to measure the environmental impact of our current offers and gain insights to develop future products, services, support and solutions that help mines be safer, smarter and more sustainable.

We believe that together we go further. We have a vision to collaborate and transform mining to a more sustainable future and work across the industry to identify opportunities to collaborate for greater impact.

MICHELIN