

Sustainability Driven: Key Performance Indicators for the Tire Sector *2019-2022*



World Business
Council
for Sustainable
Development



Tire Industry
Project

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Executive summary



Executive Summary

The Tire Industry Project (TIP) is the primary global forum on sustainability topics for the tire industry. Formed in 2005, TIP is a voluntary CEO-led initiative that brings together 10 leading companies in the sector, representing more than 60% of global tire manufacturing capacity. TIP's mission is to anticipate, understand and address global environmental, social and governance (ESG) issues relevant to the tire industry and its value chain.

Tires play a pivotal role in keeping the world in motion, while the tire sector and its value chain are indispensable in shaping a future with sustainable, safe and efficient mobility for everyone.

In 2021, TIP launched *Sustainability Driven: Accelerating Impact with the Tire Sector SDG Roadmap*. This strategic roadmap outlines seven impact pathways for tire manufacturers and serves as a guiding tool for the industry to collectively address sustainability challenges while transitioning to a low-carbon, resilient and resource-efficient economy in alignment with the United Nations Sustainable Development Goals (SDGs).

To monitor and communicate the industry's sustainability journey, we published our first annual report on members' performance against a series of environmental indicators in 2017. Now in its sixth edition, we've expanded the report to incorporate additional key performance indicators (KPIs) and qualitative information.

Starting this year, the report discloses the performance of TIP members against an expanded set of KPIs linked to ESG areas spanning the tire value chain as part of the effort to enhance transparency and disclosure in the sector. While continuing to report on established indicators such as energy consumption, CO₂ emissions, water use, waste generation, and ISO 14001 certification, this year we present results for new KPIs, including the rate of adoption of responsible sourcing policies; percentage of members with validated science-based targets; share of water withdrawals from water-stressed areas; women's representation in the workforce and on Boards of Directors and number of publications and citations of TIP-sponsored research on tire and road wear particles (TRWP).

This year's KPI report showcases TIP members' achievements, including a 10% reduction in absolute CO₂ emissions, a 31% increase in renewable electricity consumption, and a 90% rate of adoption of responsible sourcing policies, reflecting the industry's dedication to responsible practices and sustainability.

With this report, we acknowledge that monitoring TIP member company progress, individually and collectively, in areas covered by the SDG Roadmap will be critical to ensuring that the sector optimizes its contributions to the SDGs.



Introduction



01.

01. Introduction

Operating under the umbrella of the World Business Council for Sustainable Development (WBCSD), the Tire Industry Project (TIP) is the primary global forum on sustainability topics for the tire industry. Formed in 2005, TIP is a voluntary, CEO-led initiative that brings together 10 leading companies in the sector, representing more than 60% of global tire manufacturing capacity.

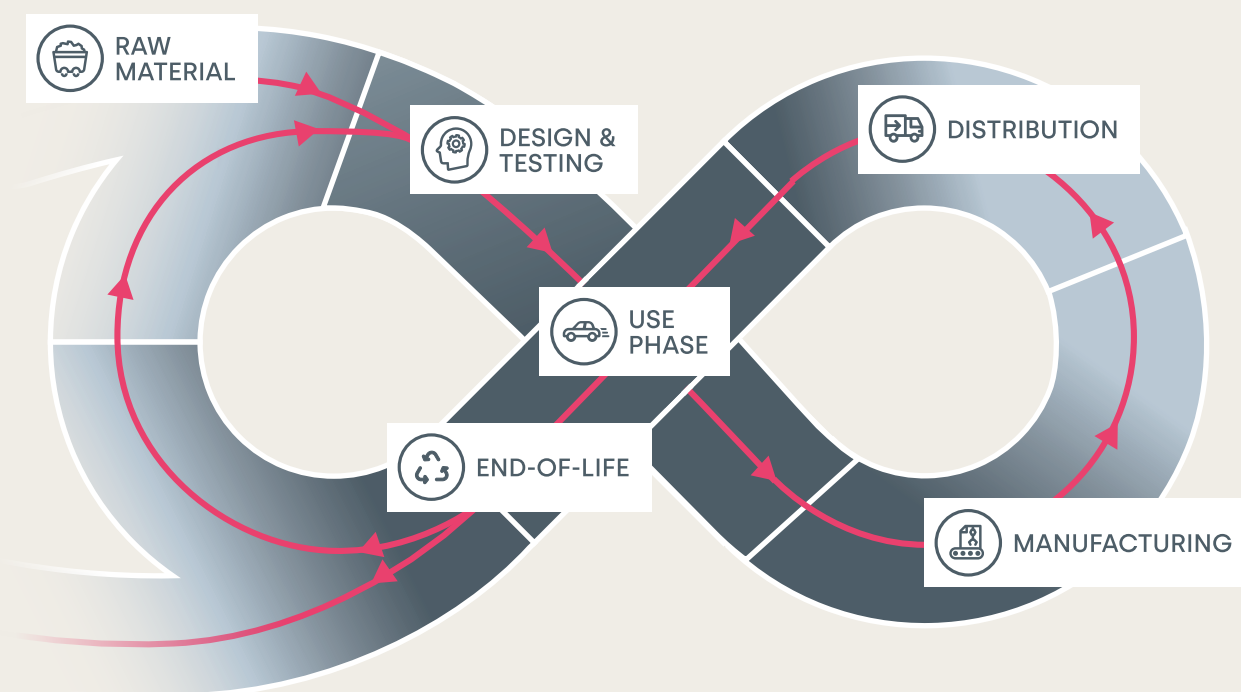
TIP's mission is to anticipate, understand and address global environmental, social and governance (ESG) issues relevant to the tire industry and its value chain.

Tires play a pivotal role in keeping the world in motion, while the tire sector and its value chain are indispensable in shaping a future with sustainable, safe and efficient mobility for everyone. Through ongoing research and development, the tire industry continues to enhance safety and environmental performance and introduce innovations like improved wet grip, extended tread wear and reduced rolling resistance. Tire companies operate throughout the value chain, encompassing raw material production and sourcing, design, manufacturing, customer use and end-of-life solutions (Figure 1).

In an effort to drive the transformation needed to achieve the United Nations Sustainable Development Goals (SDGs), TIP launched *Sustainability Driven: Accelerating Impact with the Tire Sector SDG Roadmap in 2021*. The roadmap presents seven impact pathways – opportunities to maximize positive impact and minimize negative impact across the tire supply chain, operations, products and services. We intend for the roadmap to be an inspirational tool the sector can use to build a unified response to sustainability challenges while navigating the transition to a low-carbon, resilient and resource-efficient economy, in line with the SDGs.

To monitor and communicate the industry's sustainability journey, we published our first annual report on members' performance against a series of environmental indicators in 2017. Now in its sixth edition, we've expanded the report to incorporate additional key performance indicators (KPIs) and qualitative information to help track and communicate progress on the seven impact pathways. Starting this year, the report discloses the performance of members against an expanded set of KPIs linked to ESG areas spanning the tire value chain as part of the

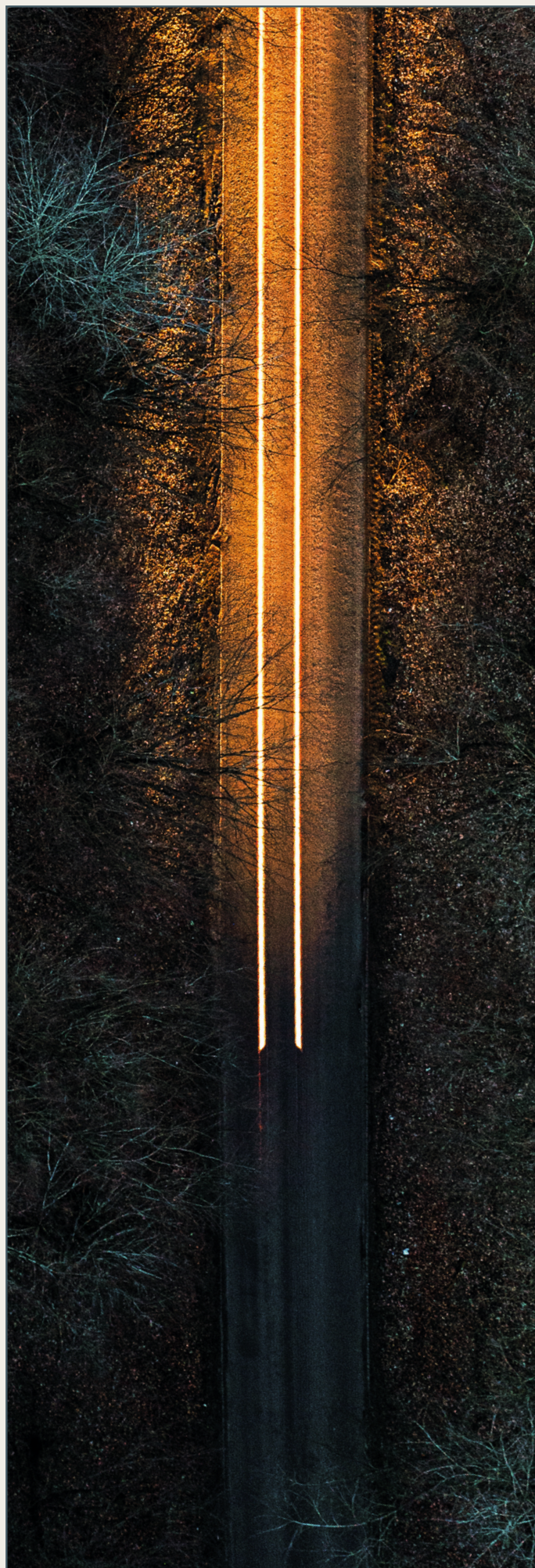
Figure 1: The tire sector value chain



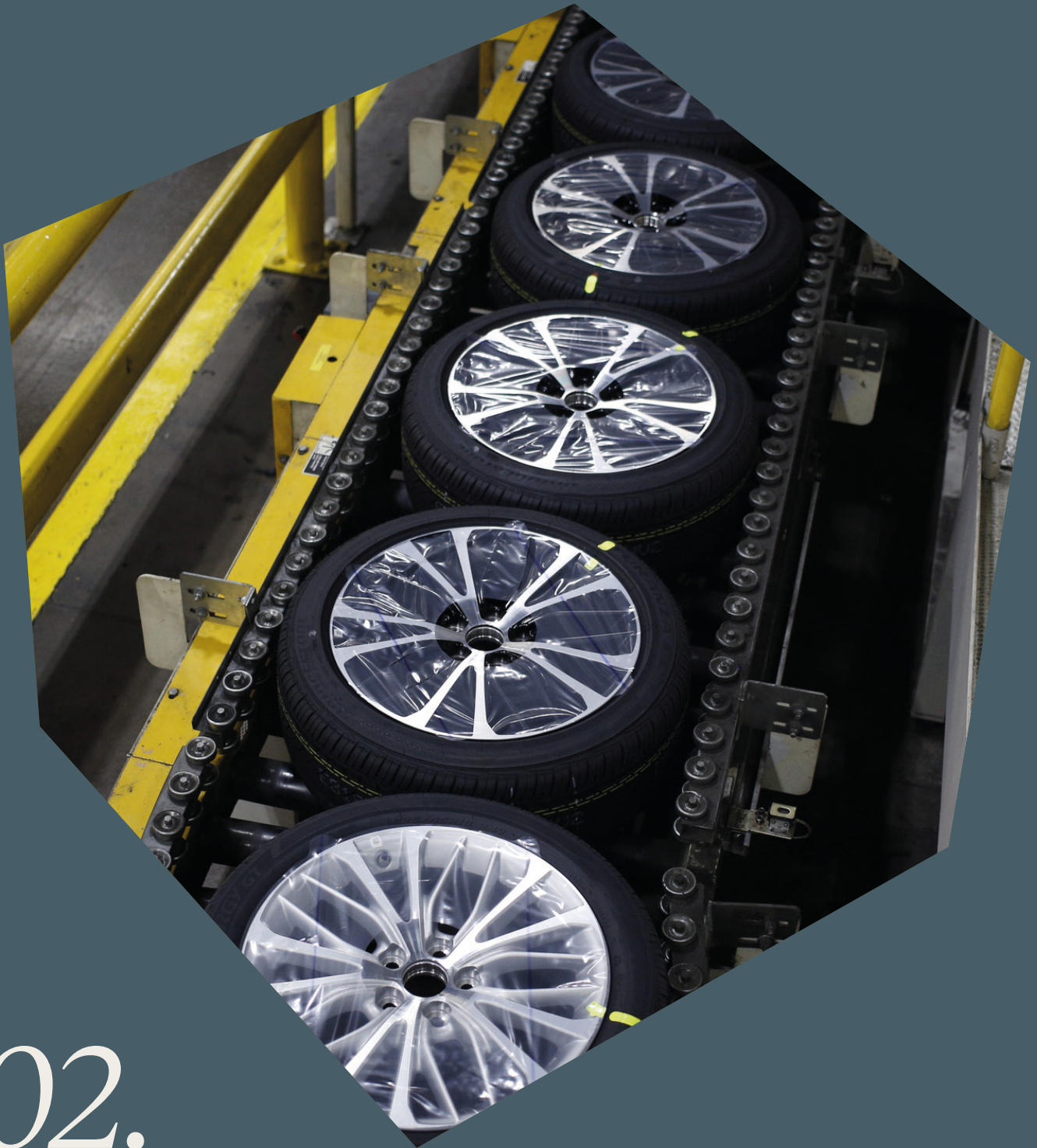
effort to enhance transparency and disclosure in the tire sector.

This report presents data collected for the 2022 operating year and covers a total of 241 manufacturing sites. As The Goodyear Tire & Rubber Company acquired Cooper Tire & Rubber Company in June 2021, the consolidated data includes the data for the combined Goodyear and Cooper.

The Methodological note in the Appendix contains details about the collection methods and definition of indicators used in the report.



Industry context and macrotrends



02.

02. Industry context and macrorends

Modest growth and a trend towards pre-pandemic levels of activity characterized the economic context for tire manufacturers in 2022, with modest growth strongly shaped by inflationary pressures, economic restrictions and business disruptions.

The conflict between Russia and Ukraine contributed to raw material supply issues and price increases, which affected global manufacturing sectors. The conflict accompanied underlying increases in the cost of energy and the potential for energy shortages, especially in Europe. Global sanctions against Russia and suspensions of various business operations in that country also impacted global tire demand. Overall, TIP member tire production declined by 0.7% in 2022, reflecting these economic conditions (Figure 2).

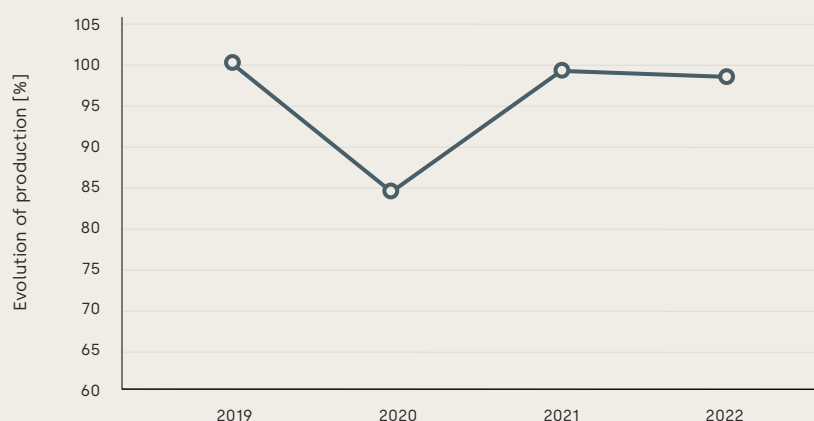
While events like the COVID-19 pandemic and the conflict in Ukraine have caused unpredictable operational and supply chain disruptions, extreme weather events associated with climate change also impacted business conditions. Events including wildfires in Europe and North America, flooding in south Asia, and heatwaves and drought in China underscored this trend in 2022. TIP members recognize the increasing risk posed by climate change and an array of initiatives are underway to reduce the tire industry's climate impact. For example, members are undergoing a rapid transition to renewable electricity sourcing, which contributed to the achievement of a 10% reduction in absolute CO₂ emissions in 2022. The

adoption of science-based targets, on-site energy-efficiency programs, responsible sourcing policies (RSPs), research into low-carbon materials, and product and service innovation are also key elements of TIP member company decarbonization efforts.

Another important macrotrend impacting the tire industry is the evolution of sustainability-related regulation and standardized reporting. In terms of regulation, tire manufacturers globally are preparing for the introduction of new or strengthened instruments aimed at reducing the environmental impact of the value chain. Such instruments span from the general, such as cross-sector carbon pricing schemes, to industry- and product-specific, such as tire labelling requirements and increasingly ambitious vehicle emissions rules.

With respect to reporting, the Corporate Sustainability Reporting Directive (CSRD) in the EU will require changes in the way listed companies report on sustainability information starting in 2025. This will apply to EU-based companies as well as those with significant activities or subsidiaries in the bloc. The directive will directly impact TIP members' sustainability efforts by establishing reporting definitions for a range of topics under the SDG Roadmap (such as climate change, water and circularity). TIP members with operations in the EU will closely monitor this and other regulations to anticipate their implementation.

Figure 2: Evolution of production levels from 2019-2022, as a % of 2019 levels









KPI performance summary



03.

03. KPI performance summary

Theme	Impact Pathway (IP)	SDG target contribution	KPI	Performance		Unit
				2021	2022	
Supply chain 	IP 1 Natural rubber sustainability	4.5 8.4 12.2	% members that disclose to the GPSNR*	n/a	100	%
	IP 2 Responsible sourcing	8.4 12.2 12.6	% members with sustainable or responsible sourcing policies covering all materials	80	90	%
Operations 	IP 3 Operations, incl. manufacturing	6.4 9.4 12.2 12.5	Energy consumption	178.5	174.0	PJ NCV*
			% electricity from renewable sources	25.7	34.8	%
			CO ₂ emissions	12.5	11.2	Mt CO ₂ e
			% members with validated SBTs*	30	30	%
			Total water withdrawals	106.6	101.4	Million m ³
			Water withdrawals from water-stressed areas	18.3	16.7	Million m ³
			Waste generation	1.12	1.11	Mt
			ISO 14001 certification rate	96	98	%
Operations 	IP 4 Employees	5.5 10.3 10.4	% sites with externally audited H&S* management system	56	63	%
			% women in total employees	14	14	%
			% women on Board of Directors	15	13	%
			% of members with public commitments to D&I*	100	100	%
Products & Services 	IP 5 Tire and road wear particles (TRWP)	12.4 12.6	Cumulative number of TIP-sponsored publications on TRWP	16	20	Number
			Annual number of citations of TIP-sponsored TRWP publications	257	486	Number
Products & Services 	IP 6 Sustainable mobility and digital solutions	3.6 9.5 11.2 12.2 12.8	Qualitative disclosure			
Products & Services 	IP 7 Low-carbon, circular solutions and end-of-life tires (ELT)	8.4 12.2 12.5	Qualitative disclosure			

* GPSNR = Global Platform for Sustainable Natural Rubber;

SBTs = science-based targets;

PJ NCV = petajoule net caloric value;

H&S = health and safety;

D&I = diversity and inclusion

Impact Pathway 1

Supply chain - Natural rubber sustainability



04.

04. Impact Pathway 1

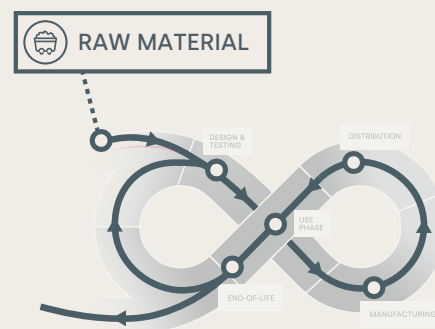
Supply Chain - Natural rubber sustainability:
Accelerate and scale activities to achieve a fair, equitable and environmentally sound natural rubber value chain – including ensuring decent work and upholding human rights.

Key achievements 2022

With respect to policies covering all materials:



100% of members submitted disclosures to the GPSNR in line with mandatory reporting requirements



TARGET 4-5

Eliminate all discrimination in education



TARGET 8-4

Improve resource efficiency in consumption and production



TARGET 12-2

Sustainable management and use of natural resources



This year, TIP introduces a KPI to track efforts on delivering a sustainable natural rubber supply chain. Natural rubber is a crucial element of the tire supply chain, and the tire industry represents 70% of global demand. Natural rubber derives in large part (>90%) from rubber trees,¹ and smallholder farmers produce a major share (85%) of the natural rubber in the supply chain, with 30 million livelihoods thought to be dependent on its production. We therefore recognize supply chain measures in natural rubber production as an important lever in improving tire sustainability across social and environmental dimensions.²

In 2020 and 2021, the Global Platform for Sustainable Natural Rubber (GPSNR) commissioned reports to assess environmental and social risks in the natural rubber supply chain for 16 producer countries³. The reports found that natural rubber poses environmental risks across six categories – including land-use change, biodiversity loss, water, soil and air quality, and climate change – as well as social impacts related to income levels and socio-economic vulnerability, labor and human rights, and land grabbing and land rights.

TIP members established the GPSNR, the leading global initiative for driving sustainability in natural rubber supply chains, in 2018. It promotes a shared Policy Framework that underpins strong sustainable purchasing policies among members while undertaking work to build capacity throughout the supply chain, promote transparency, engage smallholders and work with regulators. The GPSNR requires members to report annually on the status of Policy Framework

implementation and disclose annually in line with the GPSNR's Reporting Requirements. Mandatory reporting began in 2022 for the 2021 operating year.



Box 1: GPSNR Policy Framework

The GPSNR Policy Framework comprises eight policy components. Each component includes a series of commitments that members must include in their natural rubber production and purchasing policies and other documents. All GPSNR ordinary company members commit to:

1. Legal compliance
2. Healthy, functioning ecosystems
3. Respecting all human rights
4. Community livelihoods
5. Increased production efficiency
6. Systems and processes to drive effective implementation of policy components

7. Supply chain assessment, traceability and management
8. Monitoring and reporting on progress on, and conformance with, policy components.

The GPSNR Reporting Requirements provide member companies with a way to report on their progress in implementing the Policy Framework. The Reporting Requirements include a range of specific disclosures aimed at transparency in members' approaches to, and progress on, the commitments.

In 2022, 100% of TIP members submitted disclosures to the GPSNR in line with the mandatory reporting requirements. As tire manufacturers, TIP members must disclose in line with the guidance for Manufacturers and Traders of Processed Material, as outlined by the GPSNR.

Box 2: Business examples - GPSNR

Michelin and Continental

In 2017, Michelin launched the Rubberway tool, a digital solution to assess and map social and environmental risks throughout the natural rubber supply chain. In 2019, Michelin announced a joint venture with Continental and SMAG to further develop and deploy Rubberway. Using any web-capable mobile device, factories can engage with farmers, either directly in the field or through intermediaries, to have them answer a structured questionnaire that surveys their environmental, social and agricultural practices. In 2022, Michelin met its goal of mapping 80% of the natural rubber volumes sourced from direct suppliers. Continental uses Rubberway in combination with several other tools and initiatives to ensure 100% responsibly sourced natural rubber by 2030.

More information about this initiative is available [here](#) (Michelin) and [here](#) (Continental).

Pirelli

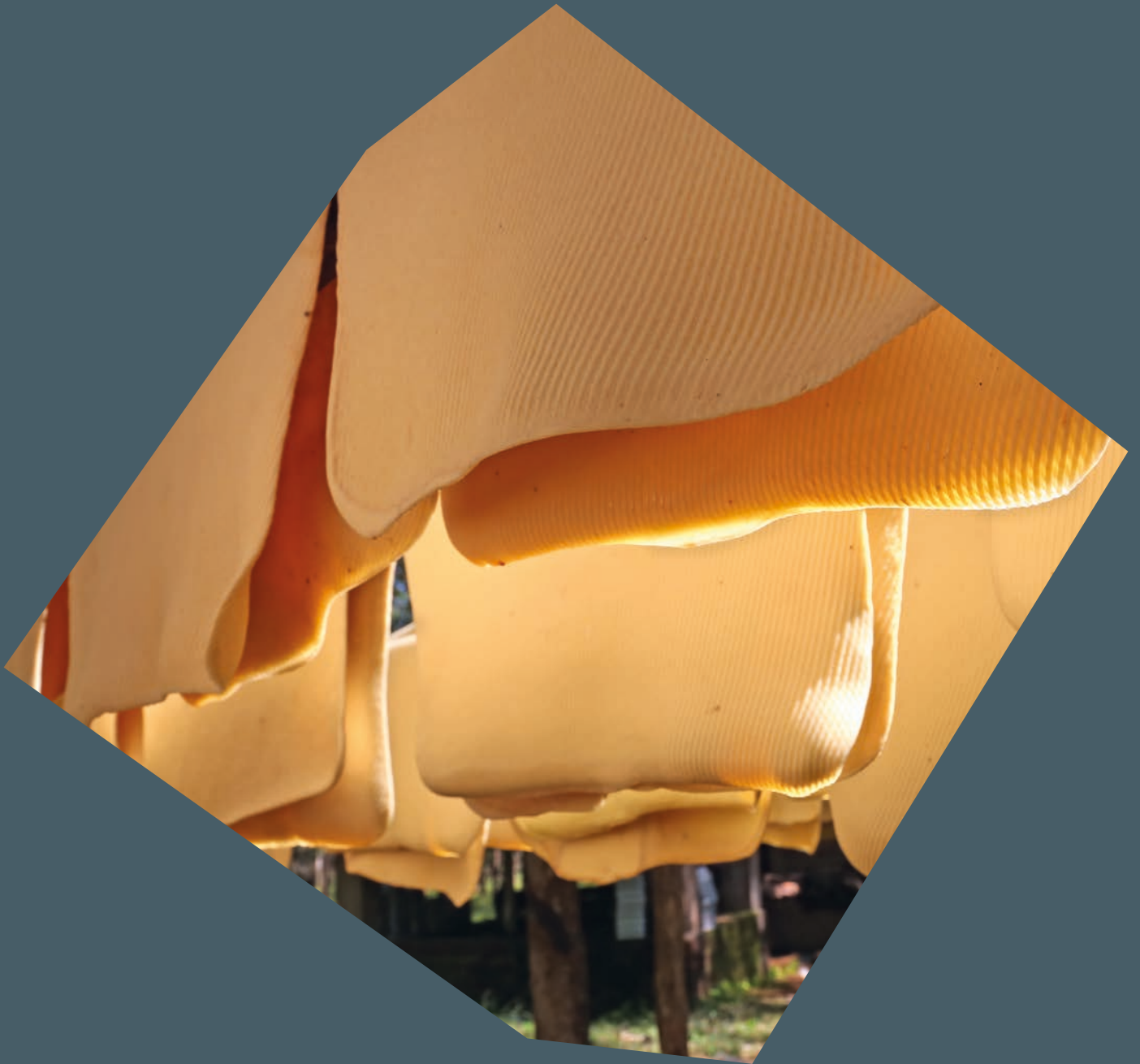
Pirelli issued its Policy on Sustainable Management of Natural Rubber in 2017, after a long process based on consultation with key international and local stakeholders. Pirelli's Policy aligns with the GPSNR Policy Framework.

At the end of 2022, 73% of Pirelli-purchased natural rubber volumes came from suppliers who are members of the GPSNR, and 99% of the volumes came from suppliers audited on-site by a third party on the implementation of the Pirelli Policy.

More information about this initiative is available [here](#).

Impact Pathway 2

Supply Chain - Responsible Sourcing



05.

05. Impact Pathway 2

Supply Chain - Responsible Sourcing:

Implement sustainable procurement practices and establish environmental, social and governance (ESG) responsibilities throughout the supply chain, including the promotion of transparency and traceability.

Key achievements 2022

With respect to policies covering all materials:



90% of members adopted a responsible sourcing policy (RSP)



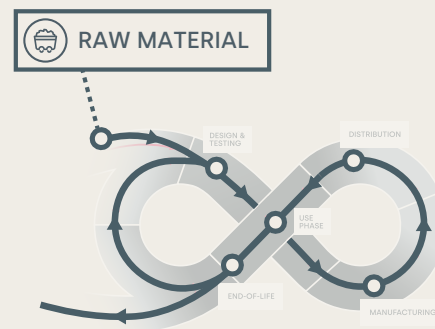
70% of members are using timebound targets in their policies



50% are embedding policies into contracts with suppliers



30% are using third parties to audit the fulfilment of policies



TARGET 8-4

Improve resource efficiency in consumption and production



TARGET 12-2

Sustainable management and use of natural resources



TARGET 12-6

Encourage companies to adopt sustainable practices and sustainability reporting



The average tire contains 10 components, which in turn incorporate a range of materials, including natural rubber, as well as synthetic elastomers, fillers, protection materials, processing aids, steel, textiles and curing systems, that each play a crucial role in tire performance.⁵ As with natural rubber, measures to ensure responsible sourcing of these materials and components will be crucial to ensuring a sustainable supply chain.

A 2022 survey by the disclosure non-profit CDP worked with 280 companies to understand the environmental impacts associated with their supply chains. This survey revealed that for climate change, "supply chain emissions (upstream Scope 3) are, on average, 11.4 times greater than operational emissions."⁶ Supply chain initiatives can thus reveal impact hotspots and highlight levers for improvement that may bring significant benefits.

The development of sustainable supply chains is often a multi-stage journey for a company. The first step on this journey typically involves understanding the landscape and **defining a policy (i)** to guide its sourcing approach while **setting time-bound targets (ii)** to ensure measurable progression. The company must then engage with suppliers to establish collaborative approaches to achieving the targets and **ensure the embedding of targets into supplier contracts (iii)**. Over time, the company will then need to follow up with suppliers to measure progress and **conduct audits (iv)** to ensure the fulfillment of agreements. As such, we have introduced a new KPI to track member implementation of each of these elements – both in relation to all materials and to specific ones. Figure 3 and Figure 4 present the results for the 2019-2022 period.

Figure 3: TIP member performance for all materials, 2019-2022

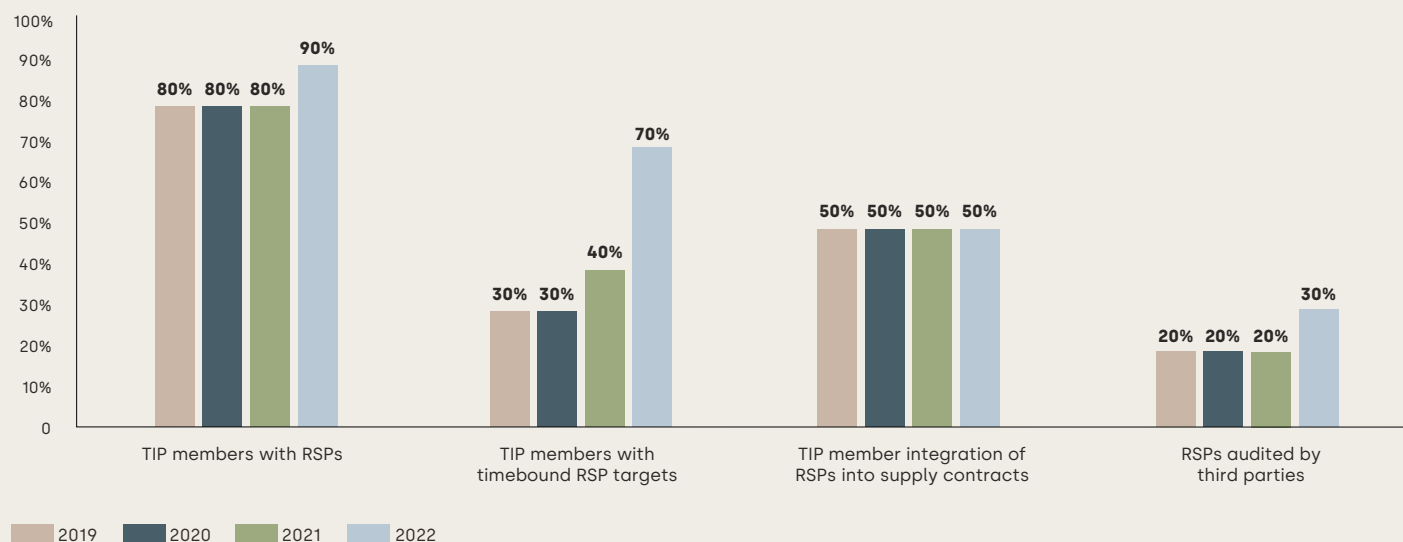
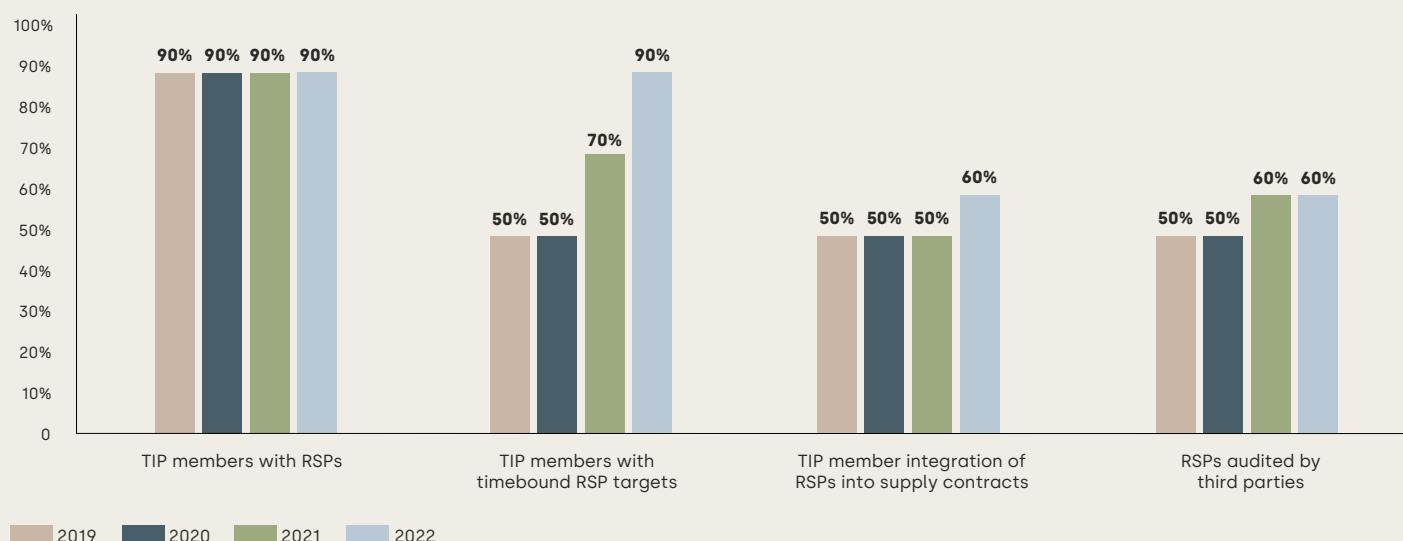


Figure 4: TIP member performance on specific materials, 2019-2022



Box 3: Business examples - Responsible sourcing policies

Bridgestone

In 2020, Bridgestone Group's Sustainable Procurement Working Group initiated work with World Wildlife Fund (WWF) Japan to develop a process for ensuring the company's supply chain is in compliance with its Global Sustainable Procurement Policy. The cooperation has continued in 2022, with the aim to strengthen sustainable rubber production and build the capacity of smallholders. The company conducted the first on-site ESG audit of its Tier 1 natural rubber processing factory and a

natural rubber plantation in Thailand virtually in March. If the audits identify a risk, the group will continuously support and develop a plan to prevent/mitigate the risk together with suppliers. The group committed to conducting on-site ESG audits of 21 natural rubber processing facilities and 4 natural rubber plantations by the end of 2022.

More information about this initiative is available [here](#).

Impact Pathway 3

Operations - Manufacturing



06.

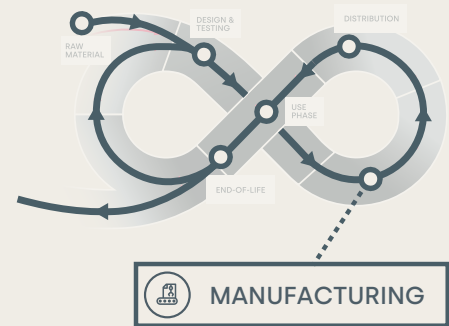
06. Impact Pathway 3

Operations, incl. manufacturing:

Develop pathways to decarbonize operations, reduce emissions and ensure the sustainable use of natural resources

Alongside efforts to deliver sustainable supply chains, the tire industry is also working to advance the SDGs through operational improvements. In this context, TIP members aim to deliver cleaner manufacturing through actions such as optimizing energy efficiency, switching to renewable sources of electricity, reducing waste output, and ensuring the sustainable use of natural resources like water.

This year, we have expanded the set of KPIs used to track the sustainability of operations. New KPIs introduced include: the share of electricity consumption derived from renewable sources; the share of TIP members with validated or committed science-based targets; and the share of water consumption derived from water-stressed areas.



TARGET 6-4

Increase water-use efficiency and ensure freshwater supplies



TARGET 9-4

Upgrade all industries and infrastructures for sustainability



TARGET 12-2

Sustainable management and use of natural resources



TARGET 12-5

Substantially reduce waste generation



Key achievements 2022



2.9% reduction in absolute energy consumption



4.9% reduction in water withdrawals



31% growth in renewable electricity purchased or self-generated



9.2% reduction in total water withdrawals from water-stressed areas



10% reduction in absolute CO₂ emissions



0.7% reduction in absolute waste generation



30% of TIP members with validated science-based targets



93% of generated waste sent to recovery

6.1 Energy consumption, energy mix and electricity derived from renewable resources

Energy consumption by TIP members decreased by 2.9% between 2021 and 2022. As production levels were roughly stable in 2022, the decrease in energy consumption is attributable to energy savings and efficiency measures, as shown by the energy intensity performance, which decreased to pre-pandemic levels of 9.7 GJ/ton.

TIP members have also been transitioning their energy mix, moving towards less carbon-intensive energy sources (Figure 6). In 2022, coal (used for heating in production) decreased from 4.1% to 3.3% of the energy mix. Meanwhile, renewable electricity (purchased and self-generated) increased substantially, from 10.5% of the total energy mix in 2021 to 14.1% in 2022, with some members purchasing almost twice the amount of renewable electricity compared to 2021. Figure 7 shows the percentage of purchased electricity from renewable sources over total purchased electricity, which reached 34.8%, underscoring this increase.

Figure 5: TIP members' total energy consumption and energy intensity, 2019-2022

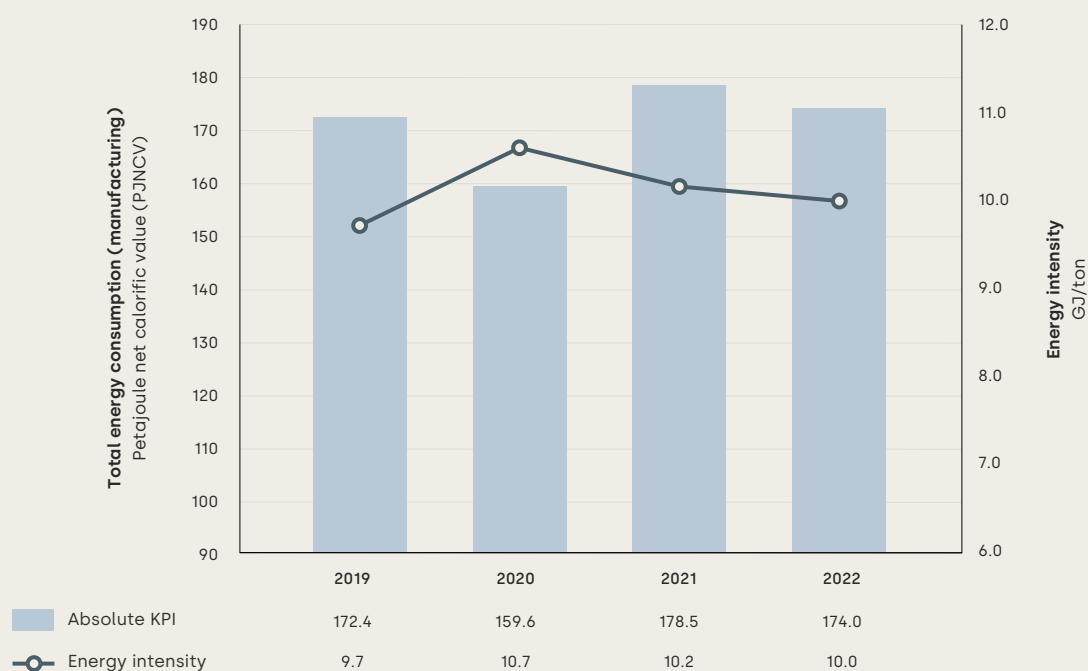


Figure 6: TIP members' energy mix, 2019-2022

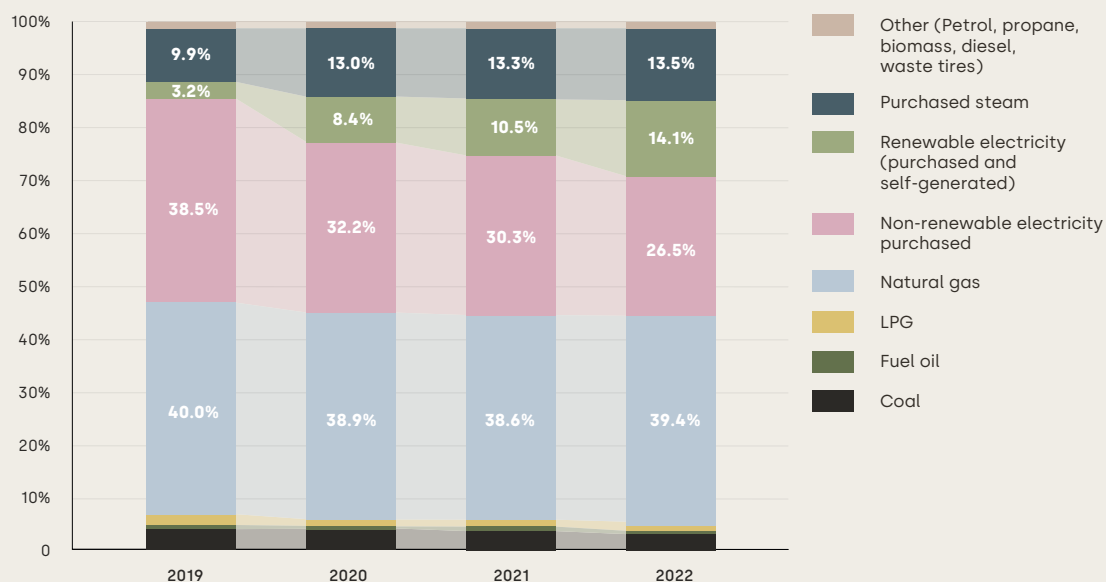
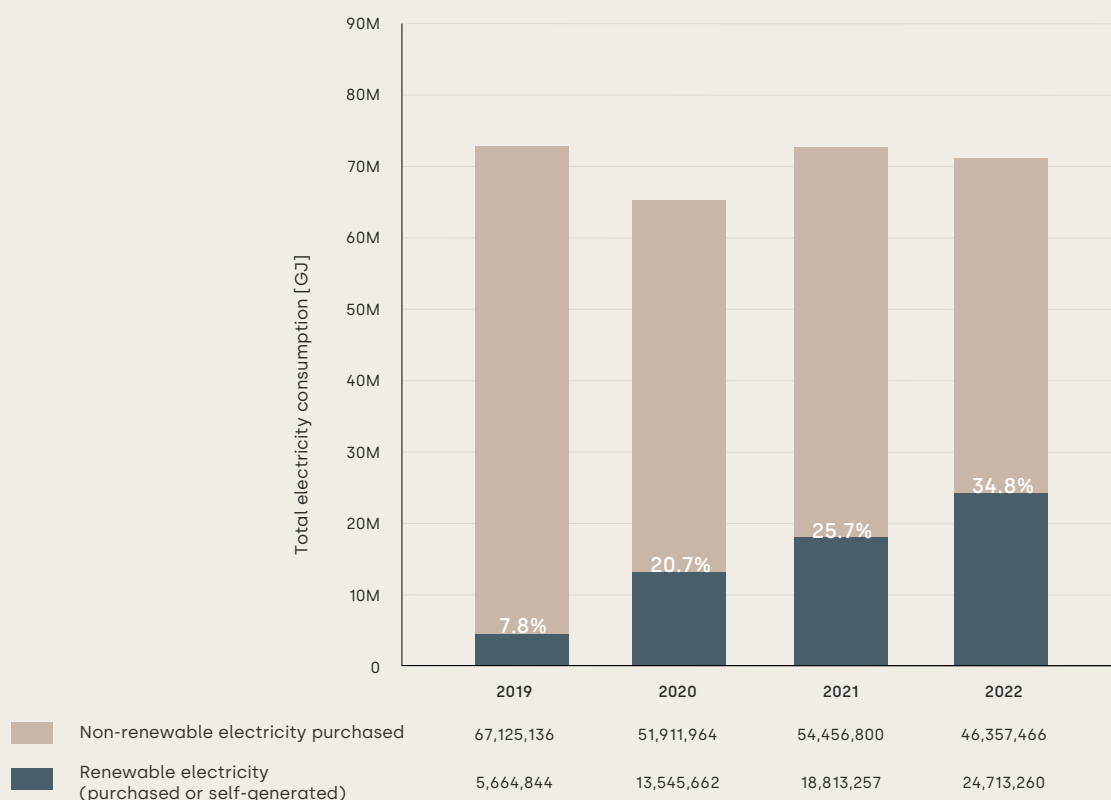


Figure 7: TIP members' electricity consumption derived from renewable sources, 2019-2022



Box 4: Business examples - Energy efficiency and energy mix

Goodyear

Goodyear's energy-efficiency programs enable its plants to better identify and implement energy projects across facilities. By conducting energy loss assessments, Goodyear reviews various energy loss categories, such as steam use, utility costs and electric efficiency, to identify opportunities for improvement. To ensure consistent project implementation, the company uses a best practice-sharing platform and a developed energy project catalogue. Moreover, it introduced a tactical energy scorecard in 2022 at all manufacturing sites to drive better day-to-day energy management by monitoring performance in areas including efficiency of boilers, compressors and chillers, air and steam leak repair programs, and LED lighting and control implementation.

More information about this initiative is available [here](#) (page 41).

Kumho Tire

Kumho Tire is working to increase its self-generated electricity capacity by installing photovoltaic panels at domestic and overseas manufacturing facilities. For example, the company started installation work to set up solar rooftop panels at the Gwangyang Logistics Center, which it expects to generate 3,072 kWh of solar power. Overseas, the company will install solar power generation facilities at two plants located in China and Vietnam. In addition to switching to renewable sources of energy, Kumho Tire is working on energy savings activities, such as steam leakage prevention projects. As part of the company's Factory Energy Management System, energy managers hold monthly energy-conservation meetings to monitor progress and share best practices for energy conservation.

More information about this initiative is available [here](#) (page 36).

Sumitomo

Sumitomo has been adopting renewable electricity at home and abroad. In 2022, with the support of NEDO, Japan's national R&D agency for energy, Sumitomo carried out a demonstration experiment to switch from natural gas to hydrogen for steam production at its Shirakawa factory and installed solar panels on-site. Elsewhere, Sumitomo is adopting renewable electricity sourcing at two factories in China and one in Turkey and introducing solar panels at facilities in China and South Africa.

More information about this initiative is available [here](#) (pages 59-60).

6.2 CO₂ emissions and decarbonization commitments

TIP members delivered sustained progress on CO₂ emissions in 2022. Despite production levels remaining stable and a decrease of 3.3% in absolute energy consumption, CO₂ emissions decreased by 10.4% during the year. This marked a record low in emissions since the start of reporting in 2009. Additionally, the intensity of CO₂ emissions continued its downward trajectory, reaching 0.64 tCO₂e/ton in 2022.

TIP members have also shown their commitment to further decarbonizing operations by aligning with the Science Based Targets Initiative (SBTi). This initiative plays a vital role in driving ambitious climate action by enabling organizations to set science-based emissions reduction targets. As of 2022, 30% of TIP members have validated science-based targets and 40% have committed to setting science-based targets (Figure 9). This significant increase in the number of TIP members engaging with SBTi highlights the tire sector's commitment to decarbonization and achieving the SDGs.

Figure 8: TIP members' total CO₂ emissions and CO₂ intensity, 2019-2022

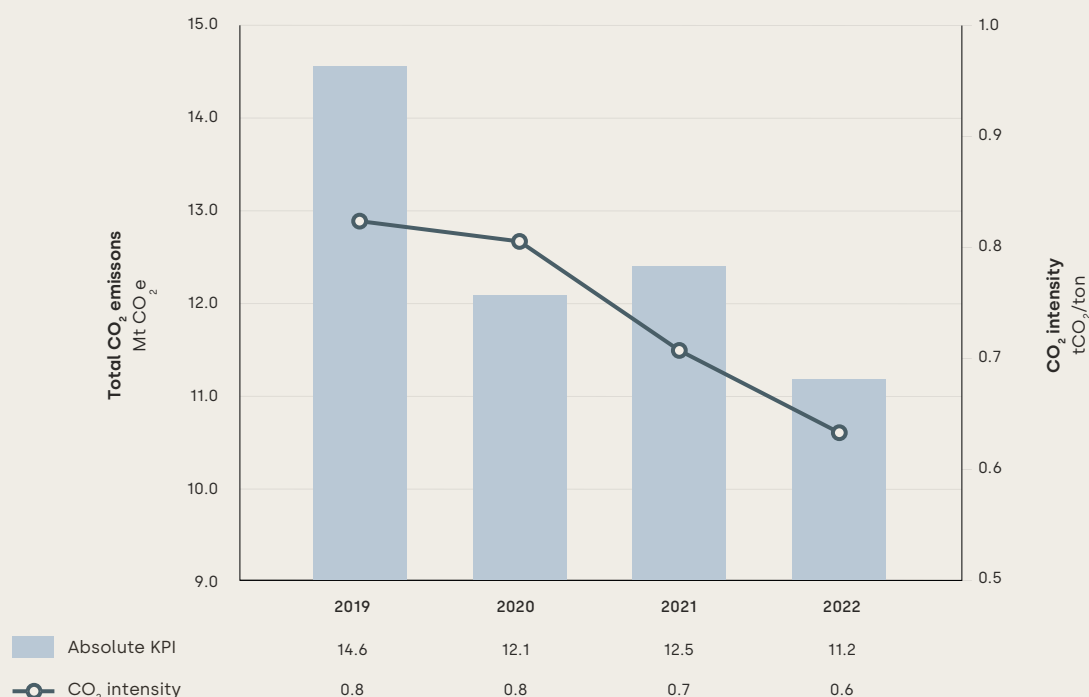
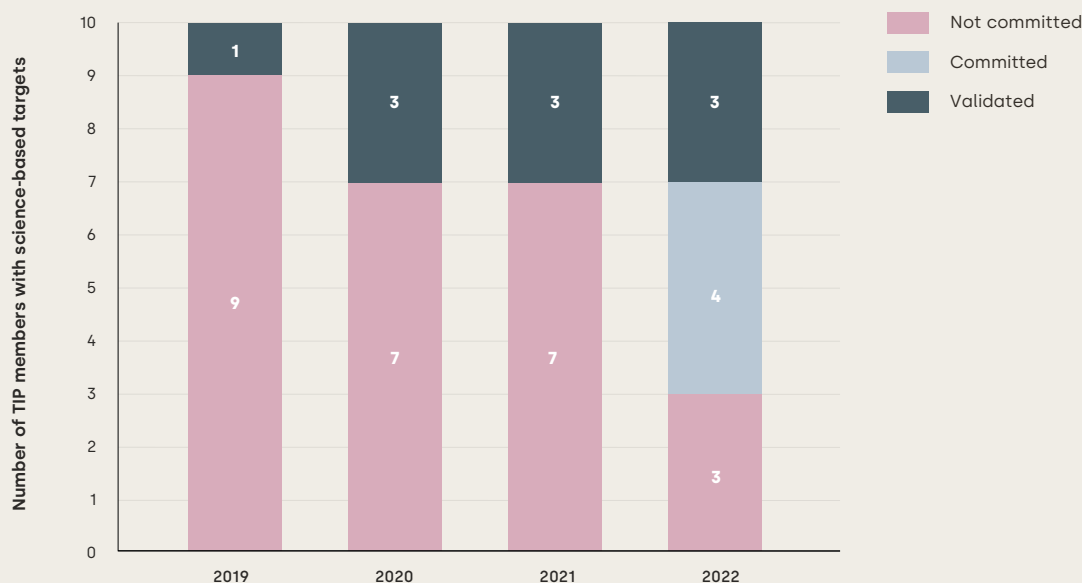


Figure 9: TIP members and science-based targets, 2019-2022



Box 5: Business examples – CO₂

Hankook

Hankook participated in the SBTi to secure objectivity and evaluate the appropriateness of its 2050 Carbon Neutral Roadmap. Hankook plans to reduce scope 1 & 2 emissions by 46.2% and scope 3 emissions by 27.5% by 2030 from the 2019 baseline, to eventually reach net-zero emissions by 2050. In 2023, Hankook will seek SBTi verification and certification. In addition, the company manages and discloses data on scope 1 and 2 greenhouse gas (GHG) emissions every year and will expand the scope of management to scope 3 emissions in consideration of the importance and capacity to reduce GHG emissions throughout the value chain. It manages scope 3 emissions by selecting nine priority categories out of the 15 outlined in GHG Protocol's Corporate Value Chain (Scope 3) Standard.

More information about this initiative is available [here](#) (pages 4 and 39).

Goodyear

In 2022, Goodyear used its 2019 GHG emissions footprint as a baseline to identify key hot spots in its value chain that require decarbonization, including purchased goods and services, energy, transport and the use phase. While the use phase is not part of Goodyear's science-based targets, the company continues to explore elements that it can leverage to reduce emissions, such as rolling resistance and tire weight. For the three hot spots included in its science-based targets, Goodyear identified "hot spot owners" who are responsible for developing strategies to reduce GHG emissions, such as using and developing sustainable feedstocks and low-emissions materials, reducing material consumption, fostering supplier climate commitments, adopting renewable energy sources and optimizing transport mode, miles and density.

More information about this initiative is available [here](#) (page 14).

6.3 Water consumption, waste generation and ISO 14001 compliance

In 2022, total water withdrawals and water intensity decreased by 4.9% and 4.2% respectively, compared to 2021. For the first time, TIP members started reporting on water withdrawals from water-stressed areas, as defined by the Aqueduct Water Risk Atlas tool developed by the World Resource Institute (WRI). The percentage of water consumption coming from areas with "extremely high" and "high" levels of water stress decreased to 16% in 2022 (compared to 18% in 2019), as seen in Figure 10. This demonstrates TIP members' commitment to minimizing water consumption by implementing water stewardship policies and actions, especially in areas affected by water stress.

Figure 11 shows TIP members' absolute waste generation and waste intensity since 2019.⁷ The total amount of waste generated decreased by 0.7% in absolute terms between 2021 and 2022, while waste intensity was stable at 63.8 kg/ton.

In 2022, TIP members sent the majority (93%) of waste generated to recovery operations, including reuse, recycling, composting or incineration with energy recovery. This percentage marks a record high from the first data point in 2014 (Figure 12).

TIP members continue to have a holistic management approach to monitoring and improving their overall environmental performance of their sites, as shown by the adoption of the ISO 14001 standard, the leading international standard that outlines the requirements for environmental management systems (EMS). Figure 13 shows TIP members operated a total of 241 manufacturing sites in 2022, of which 235 (98%) were ISO 14001-certified. For many TIP members (60%), all sites were ISO 14001-certified (a 100% certification rate). The high rate of certification showcases the commitment of TIP members to measuring and continually improving their environmental performance.

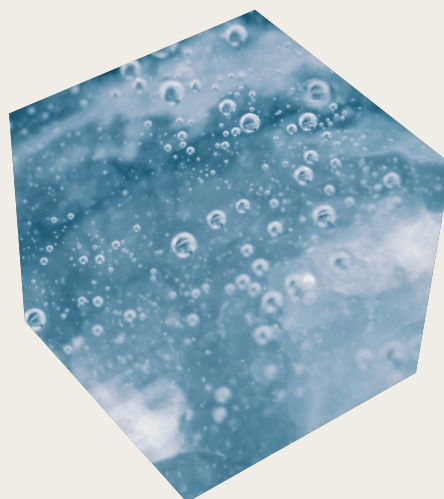


Figure 10: TIP members' water intake from water-stressed* and non-water-stressed areas, 2019-2022

* One TIP member could only provide data on water withdrawals from water-stressed areas for 2021, hence reported values for 2019, 2020 and 2022 may be lower than actual figures.

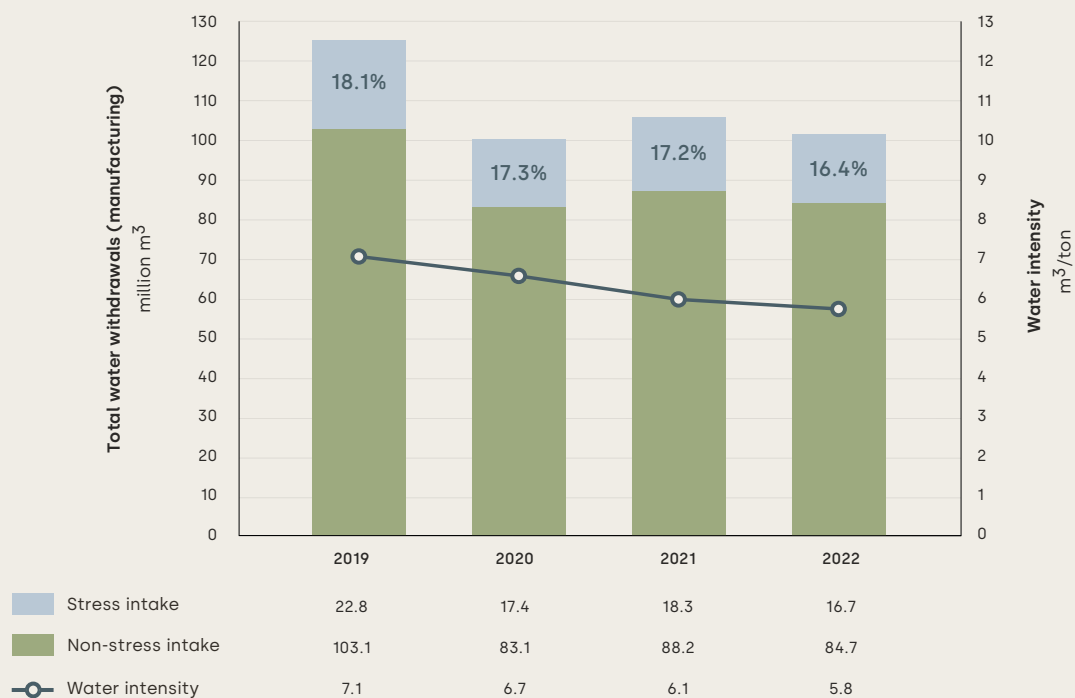


Figure 11: TIP members' total waste generated and waste intensity, 2019-2022

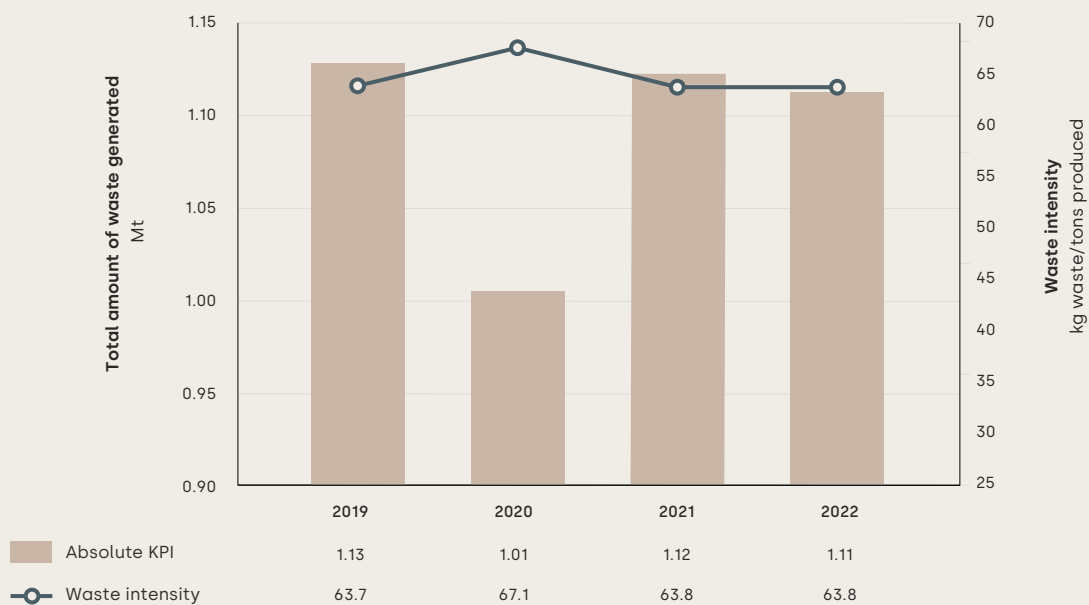


Figure 12: Breakdown of waste sent for elimination and recovery, 2019-2022

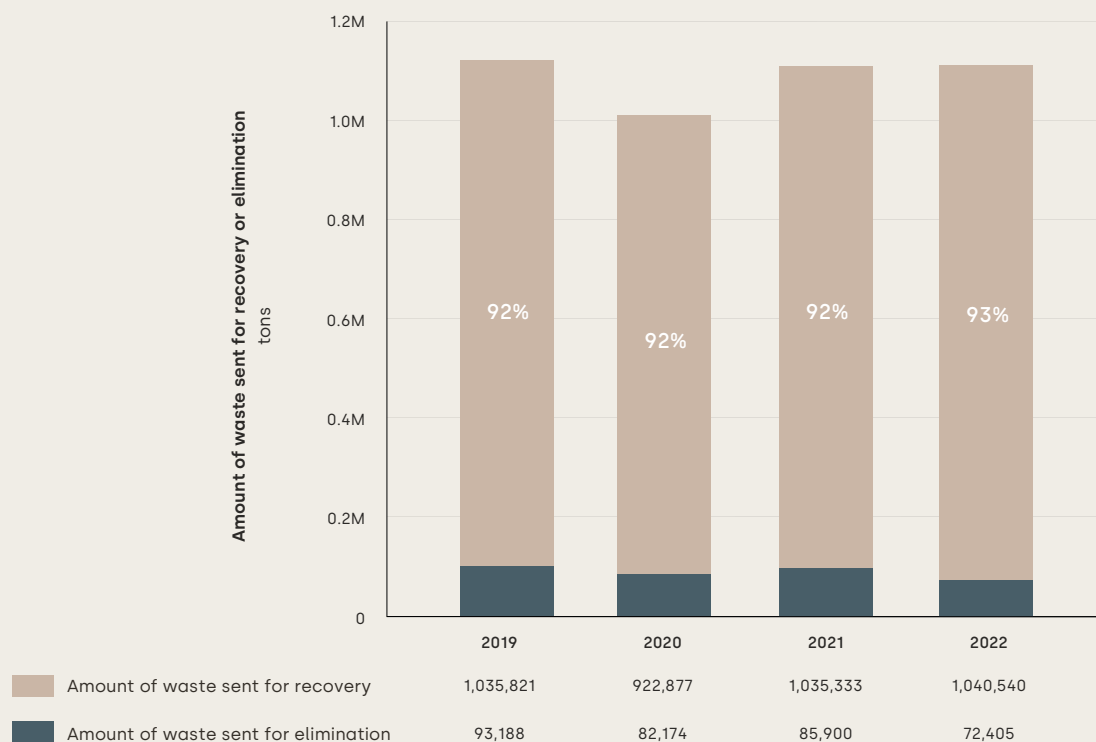
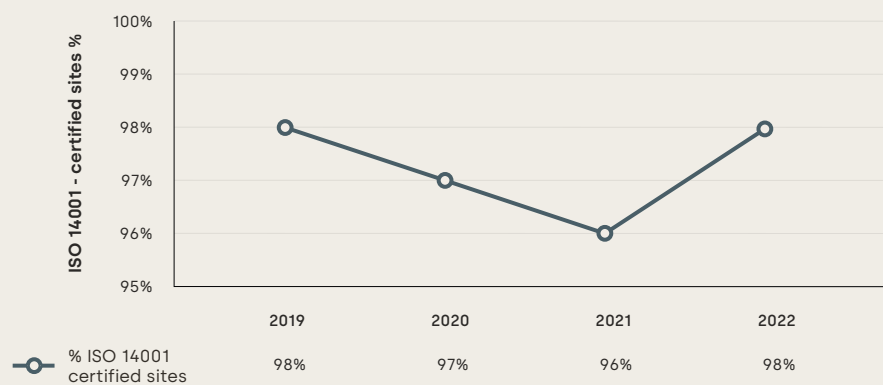


Figure 13: Percentage of TIP member sites that are ISO 14001-certified, 2019-2022



Box 6: Business examples – Water, waste, ISO 14001

Yokohama

In 2022, Yokohama conducted a comprehensive water risk assessment, combining local information with WRI's Aqueduct water risk assessment tool, considering water volume and quality risks in different countries. It followed this with capital investments in domestic production bases (Mie and Onomichi) to enhance leakage protection and water recycling. Overseas production sites have also implemented water-saving measures, including a closed-loop water system in India, rainwater collection for cooling and restroom use in Thailand and China, and the installation of water treatment facilities for wastewater quality. These efforts reflect the company's commitment to water conservation and risk management across its global operations.

More information about this initiative is available [here](#).

Hankook

Hankook Tire & Technology continues to reduce waste generation to minimize the environmental impact of waste. The company outsources the disposal of waste from operations to professional disposal service providers to ensure proper processing through incineration, landfilling and recycling. To expand the use of recycling for waste generated from production activities, Hankook's Daejeon Plant conducted an investigation into waste disposal companies to assess the suitability of recycling outsourcing methods and contracting with the chosen companies to implement its waste recycling processes. As a result, the volume of waste going to incineration decreased by approximately 80% compared to the previous year. Hankook plans to further expand the recycling approach to its Geumsan plant, aiming to achieve resource circularity for waste.

More information about this initiative is available [here](#) (page 41).

Kumho Tire

Since obtaining its first ISO 14001 certification in 1996, Kumho Tire has consistently undertaken internal diagnostics and environmental impact assessments. The company undergoes annual follow-up management and certification renewal audits by an accredited environmental management system certification agency. These practices have allowed Kumho Tire to establish a foundation for proactively and continuously reducing the environmental impact of production activities and services, facilitating ongoing environmental improvement efforts.

More information about this initiative is available [here](#) (page 19).



Impact Pathway 4

Operations – Employees

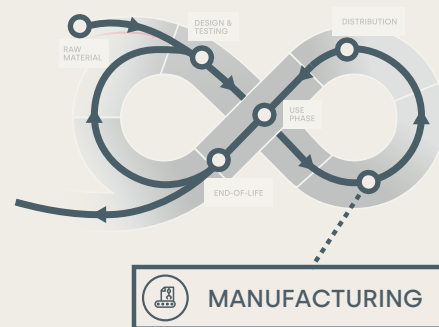


07.

07. Impact Pathway 4

Operations - Employees:

Ensure safe and inclusive working environments and equal opportunities for all employees.



Key achievements 2022



63% of sites have implemented an externally audited health and safety management system



100% of members have a public commitment to diversity and inclusion

TARGET 5-5

Ensure full participation in leadership and decision-making



TARGET 10-3

Ensure equal opportunities and end discrimination



TARGET 10-4

Adopt fiscal and social policies that promote equality



TIP members recognize that significant performance improvements are available to companies that commit to policies and practices that deliver a more diverse and inclusive workforce. A key impact pathway for TIP members is therefore enabling diversity, equity and inclusion in their employment practices, as well as ensuring that people working across the tire value chain have access to safe working environments and fair terms of employment.

In 2022, TIP members employed over 500,000 people, representing a wide range of countries, cultures and groups. Efforts to advance this Impact Pathway involve implementing shared principles ensuring all employees have access to a minimum quality of work and ensuring that working practices are respectful of and sensitive to local contexts.

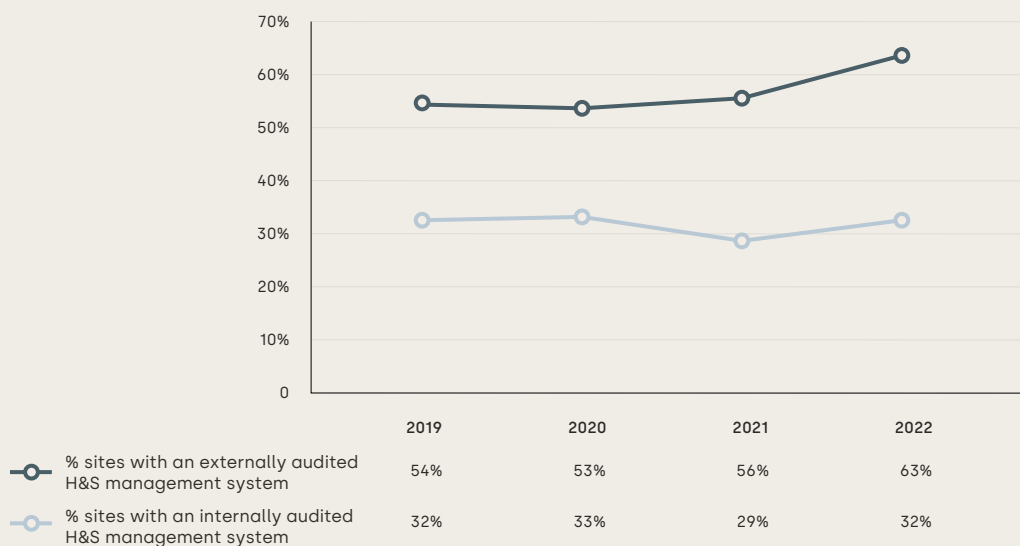


7.1 Safe working environments

For the 2023 report, we are introducing a KPI to enable reporting on the rate of adoption of health and safety (H&S) management systems at the site level. TIP members will report on their progress in implementing H&S systems from 2019

onwards, differentiating between those that are (i) externally audited by a third party and (ii) only internally audited. The adoption of externally audited systems has been on an upward trend since 2019, reaching 63% in 2022. Meanwhile, for internally audited sites, performance has been more stable, at around 32% during the period (Figure 14).

Figure 14: Percentage of sites with an externally audited and internally audited health and safety management system, 2019-2022



Box 7: Business examples - Safe working environments

Toyo

Each Toyo Tire Group base conducts training following a level-specific safety education system. Toyo is focusing on improving its hazard prediction (known as kiken yochi, or KY, in Japanese) training and hands-on learning. The company has thus set up Safety KY Training Halls at seven business sites (as of 2022) where employees learn the importance of working according to rules, through hands-on experience of the dangers of equipment, using machines for educational purposes. Toyo is also improving the education of employees authorized to perform non-routine hazardous tasks with a high risk of accident and educating safety assessors and training personnel working in equipment planning and design and plant equipment management. At the end of 2022 there were 359 certified employees.

More information about this initiative is available [here](#).

Pirelli

Pirelli carries out hazard and risk assessments to identify what could cause damage to health and safety in the workplace and integrates the resulting priorities and targets into action plans. The company pursues its "Zero Accidents Objective" through investments aimed at technical improvements in work conditions while constantly insisting on the cultural and behavioral aspect of all company players. In 2022, for the 14th consecutive year, Pirelli was an official partner of the European Occupational Safety and Health Agency (EU-OSHA), which works to address a different problem every two years.

More information about this initiative is available [here](#) (pages 202 and 214).

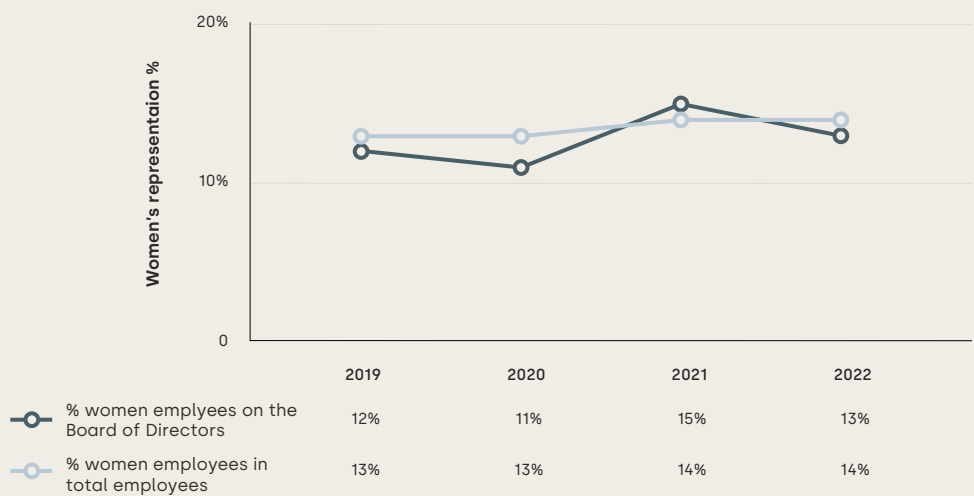
7.2 Women's representation in TIP member companies

SDG Target 5.5 calls for the achieving of "women's full and effective participation and equal opportunities for leadership at all levels of decision-making" by 2030. TIP members are pursuing efforts to achieve greater inclusion of women at multiple levels – widening the opportunities for the participation of women in all roles, as well as targeting improved representation at the executive level. In line with the Global Reporting Initiative (GRI) reporting

framework, we track these two levels via the following KPIs: (i) women's representation among total employees and (ii) women's representation on the Board of Directors.

Both these KPIs show a similar performance level in the period 2019-2022. The average currently sits at 14% women across the total workforce and 13% on the Board of Directors in 2022. Both KPIs are trending upward, but women's representation constitutes an area for improvement for TIP members. Box 8 outlines the initiatives of TIP members to progress in line with the SDG Roadmap and aims of SDG 5.

Figure 15: Percentage of women employees on the Board of Directors and as a share of total employees, 2019-2022



7.3 The percentage of TIP members with public commitments to diversity & inclusion

In addition to current performance, TIP member commitments to ongoing improvements and their long-term vision for diversity and inclusion in the workforce are important indicators of their efforts

on the outlined actions. Since 2019, **100% of members have a public commitment to diversity and inclusion.**

Box 8: Business examples – Women's representation and diversity & inclusion

Michelin

Michelin has an objective to achieve gender balance among group senior executives and managers by 2030. The company is pursuing initiatives in schools and universities around the world to present the diversity of industrial jobs and their appeal to women in surrounding communities. With the same objective of attracting more women to the shopfloor, Michelin's production plants are deploying a variety of programs to improve workstation ergonomics. In every host country, the company is analysing workshops to identify the ones that are accessible to women and to upgrade facilities as needed. Michelin is also committed to facilitating work-life balance, with benefits including flextime arrangements, working from home, daycare facilities and nursing rooms, financial aid for childcare, service centers and maternity support. Michelin is committed to a broad definition of diversity and uses a composite indicator called IMDI to assess 5 diversity dimensions: gender balance, identity, equal opportunity, disability and multi-national management.

More information about this initiative is available [here](#) (pages 214-216).

Yokohama

In 2016, Yokohama established the Women's Participation and Advancement Task Force, which it renamed as the Diversity Promotion Task Force in 2019 to coincide with an expanded scope of activities. The task force works to create a corporate culture in which a diverse range of employees can succeed. Key activities include providing support for child and family caregivers, conducting seminars to facilitate the acceptance and understanding of people with disabilities and people in the LGBTQ+ communities, and promoting the development of a workplace environment that is comfortable for a diverse range of people. Yokohama also pursues diversity via workstreams including: (1) Recruitment from Many Sources, (2) Employment of Persons with Disabilities, and (3) Employment of Older Persons.

More information about this initiative is available [here](#).



Impact Pathway 5

Products and Services - Tire and road wear particles



08.

08. Impact Pathway 5

Products and Services - Tire and road wear

particles: Further leverage multi-stakeholder efforts to achieve evidence-based solutions that address tire and road wear particles (TRWP).

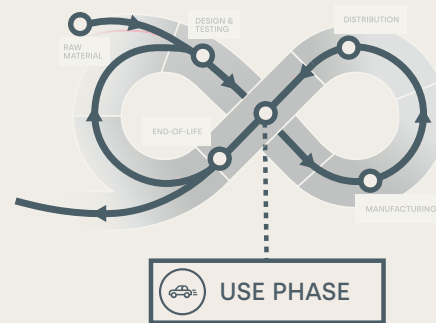
Key achievements 2022



Sustained output of TIP-sponsored research papers related to TRWP



486 citations of TIP-sponsored research papers in 2022 demonstrates TIP's ongoing impact in the scientific community



TARGET 12-2

Sustainable management and use of natural resources



TARGET 12-6

Encourage companies to adopt sustainable practices and sustainability reporting



Tire and road wear particles are debris produced by the necessary friction between tires and the road surface. They are tiny, elongated particles, typically measuring around 100 micrometers.⁸ TRWP are a mix of roughly half tire tread material and half road-pavement material.⁹ With a density of ~1.8 g/cm³, TRWP are expected to sink in water.⁸

Since 2005, TIP has supported research into the potential human health and environmental impacts of tires throughout their life cycle. Much of the research supported by TIP has been published in peer-reviewed journals. Additionally, TIP has shared key findings with scientific communities at conferences to amplify its impact.

Key areas of ongoing research for TRWP include:

- The physical and chemical characteristics of TRWP;
- The development of methods to analyze and quantify TRWP in the environment;
- The pathways of TRWP in the environment;
- The degradation of TRWP in the environment;
- The potential impact of TRWP on human health and the environment.

The annual output of TIP-supported publications reflects our ongoing commitment to this topic. This includes contributing to a growing knowledge base, with multiple publications each year, and ensuring such knowledge reaches stakeholders across the scientific community, reflected in annual citations reaching 486 in 2022. The

scientific community cited TIP-sponsored research papers 89% more in 2022 compared to 2021, reflecting that the impact is growing. This is also a result of our efforts to engage key stakeholder groups.



Figure 16: Annual and cumulative number of TIP-sponsored papers concerning TRWP published, 2019-2022

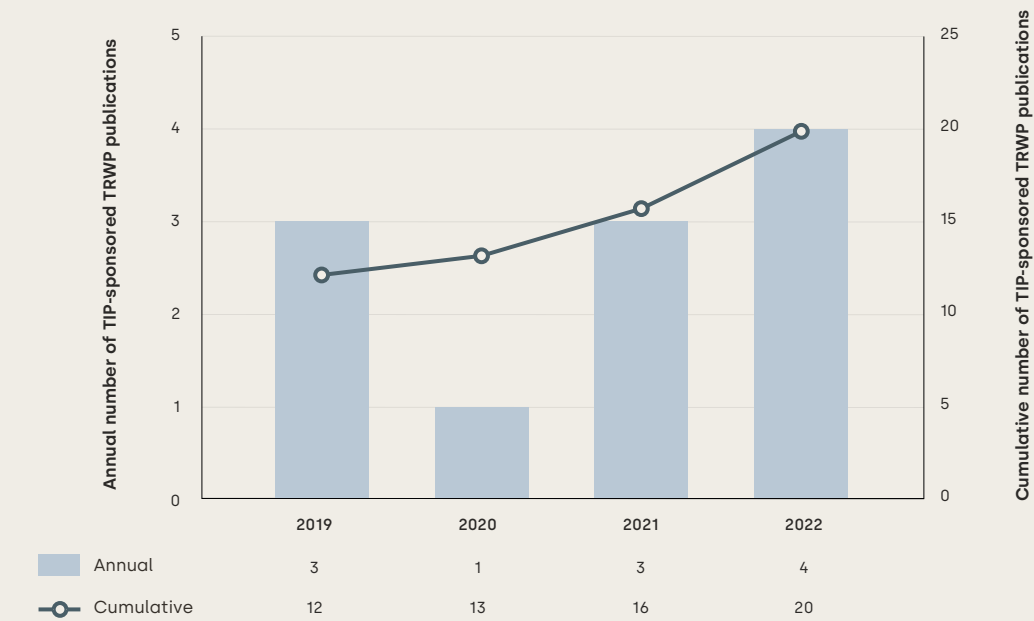
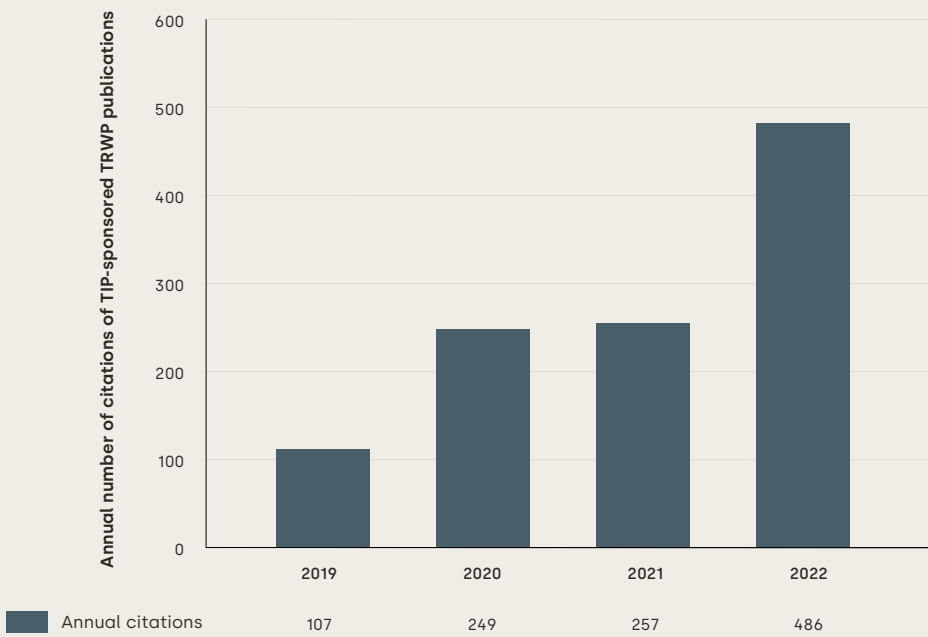


Figure 17: Annual number of citations of TIP-sponsored publications concerning TRWP



Box 9: TIP TRWP efforts

Key efforts to advance understanding of TRWP include:

- Contributing to new science on TRWP through the sponsorship of research, reaching a total of 20 TIP-supported peer-reviewed publications in 2022, ensuring all publications are open access;
- Disseminating and communicating research and knowledge through engagement at the UN Plastic Treaty also referred as the International Legally Binding Instrument on Plastic Pollution, and at conferences such as the Micropol and Ecohazard Conference, the conference of the American Chemical Society, the International Conference on Chemistry and the Environment, the Tire Technology Expo, and the Society of Environmental Toxicology and Chemistry conferences (EU and North America);

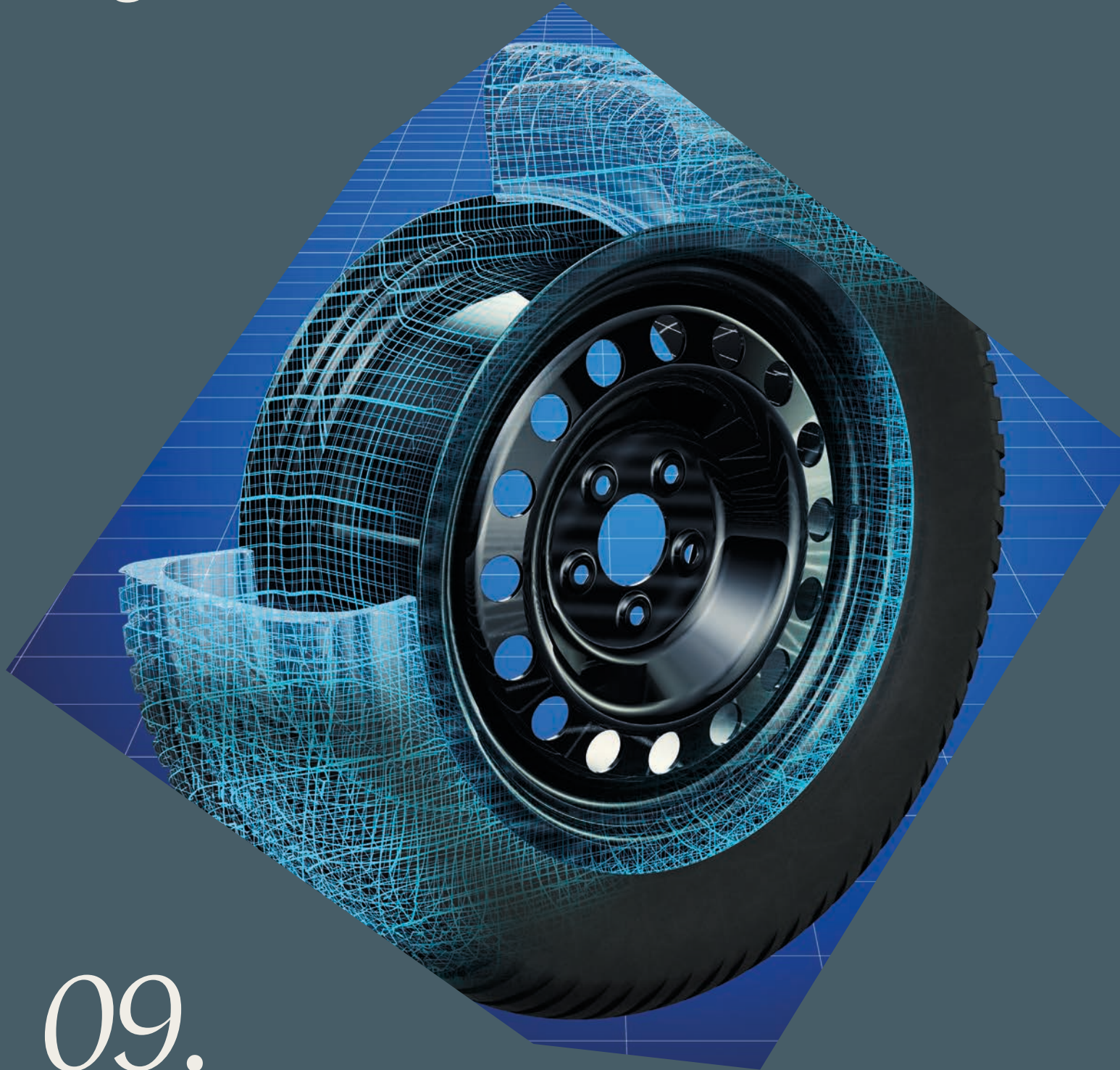
- Contributing to 5 ISO technical specifications relating to TRWP, including "Framework for physical and chemical characterization of TRWP" and "Framework for assessing environmental fate of TRWP", and an additional technical specification, "Nanotechnologies — Method to quantify air concentrations of carbon black and amorphous silica in the nanoparticle size range in a mixed dust manufacturing environment".
- Engaging in the European TRWP Platform and with academia.

We will continue our contributions to the advancement of science and mitigation on this topic by broadening interactions with academia and stakeholders.



Impact Pathway 6

Products and Services – Sustainable mobility and digital solutions



09.

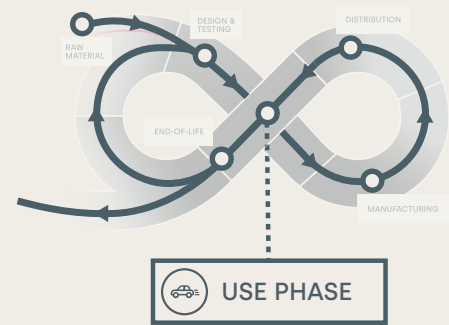
09. Impact Pathway 6

Products and Services – Sustainable mobility and digital solutions: Accelerate the sustainable mobility transition by raising awareness of the impact of user behavior, designing connected and intelligent tires and providing innovative digital solutions.

Tire-user interaction is a key source of sustainability-related impacts, presenting opportunities for risk-reduction and improvements in social and environmental performance. This is visible through two lenses:

- The impact of tire performance on the user improving user experience and safety by innovating and advancing tire products and services;
- The impact of user behavior on the tire – improving user awareness of their influence over the safety and environmental performance of tires, by both driving behavior and tire maintenance, which can improve tire longevity, fuel consumption, and carbon emissions and even impact the generation of TRWP.

Our efforts to advance this impact pathway combine key pillars of technology improvement and capacity building for a holistic approach to sustainable tire use.



TARGET 3-6

Reduce road injuries and deaths



TARGET 9-5

Enhance research and upgrade industrial technologies



TARGET 11-2

Affordable and sustainable transport systems



TARGET 12-8

Promote universal understanding of sustainable lifestyles



TARGET 12-2

Sustainable management and use of natural resources



9.1 Intelligent and connected tires

TIP members recognize the potential for product innovation in digital and smart solutions to achieve safer and more sustainable mobility. Part of this effort includes work to develop intelligent and connected (IC) tire products and services. IC tires are technologically advanced tires that gather data and transmit real-time information and predictive insights about their own condition or the surrounding environment to vehicle owners, fleet managers or tire manufacturers. IC tires allow stakeholders to be better informed and make safer, more coordinated and smarter use of the vehicle. By leveraging the power of sensors and other connectivity features, IC tires aim to improve tire performance, enhance safety and provide valuable insights to drivers and stakeholders in the automotive industry. Box 10 outlines some of the key sustainability benefits of IC tires.

Each TIP member is adopting a distinct and innovative approach to integrating IC tires into offerings. In addition to individual efforts

by TIP members, a notable initiative bringing together certain TIP members is the Global Data Service Organisation for Tyres and Automotive Components (GDSO), as outlined in Box 12. Box 11 outlines some examples of IC tire initiatives.



Box 10: Environmental and social benefits of intelligent and connected tires

Some key features and benefits of intelligent and connected tires include:

1. Making road transport safer:

- Identifying risk of tire damage, abnormalities, such as after hitting a curb or dangerous road conditions to prevent future incidents;
- Gathering data on road conditions, tire grip and handling characteristics, allowing drivers to adjust their driving behavior accordingly and optimize vehicle performance;
- Tire pressure monitoring systems (TPMS) highlighting pressure loss events and calculating remaining safe driving distances.

2. Reducing CO₂ emissions and improving sustainability via:

- Optimizing fuel consumption;
- Measuring tread depth and monitoring wear patterns to estimate the remaining lifespan of the tire, helping drivers proactively plan for tire replacements;
- Adoption by cargo fleets to optimize fleet performance.

3. Enabling the energy transition to zero emissions:

- Recognizing that rolling resistance strongly influences battery electric vehicle (BEV) range.

9.2 Vendor and user awareness campaigns

TIP members have a long-established practice of working with vendors and users to raise awareness and drive behavior change to advance safe mobility and reduce the life-cycle impacts of their tires. As part of the UN Decade of Action for Road Safety 2021-2030, the UN General Assembly has adopted a target to prevent at least 50% of road traffic deaths and injuries by 2030. The education of vendors and users of vehicles to promote safe use is a

vital part of a holistic approach to road safety, which also includes efforts on vehicle design, the enhancement and enforcement of laws on behavioral risks such as speeding, and the provision of emergency care for the injured.

At the same time, raising awareness of the impact of driving behaviors and tire maintenance can contribute to reductions in the life-cycle impacts of tires. Combining improved awareness with the data and connectivity associated with IC tires has the potential to drive significant improvement in the environmental performance of tires, as well as contributing to driving safety.

Box 11: Business examples - Intelligent & connected tires and awareness campaigns

Toyo

As a tire manufacturing and sales company that supports a society of safe mobility, Toyo believes that one of its most important duties is to help drivers learn how to use tires appropriately. Using its proprietary driving simulator, the company encourages drivers to experience conditions such as hydroplaning, the maneuverability of the vehicle under different tire pressures, and the difference between worn and new tires when braking on wet roads or getting a puncture. Each year, Toyo runs tire safety awareness events to educate drivers. In 2022, more than 1,000 drivers participated at six locations around Japan. Toyo will continue using the driving simulator to further boost interest in tires and help make drivers aware of how to use them properly.

More information about this initiative is available [here](#).

Bridgestone

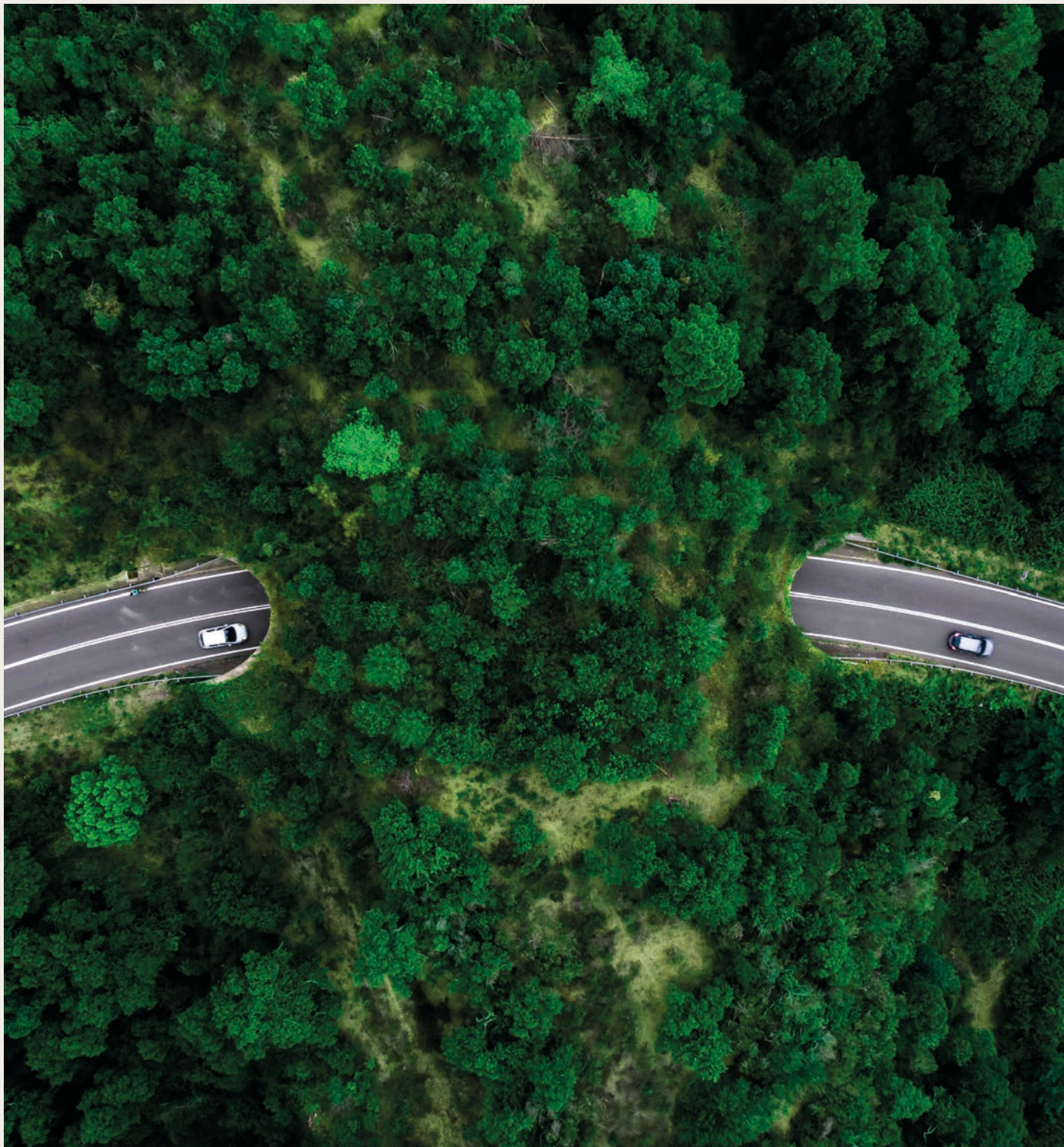
Established in 2022, Bridgestone's Global Road Safety Task Force (RSTF) aims to enhance the group's current road safety efforts globally. Being aware of its contribution to United Nations Sustainable Development Goal Target 3.6 (to halve the number of global deaths and injuries from road traffic accidents) and the Decade of Action for Road Safety 2021-2030, the RSTF has transformed the group's local initiatives into one global synergistic program – the Bridgestone Road Safety Program (BRSP) – in cooperation with the Global Road Safety Partnership (GRSP), which will start on a trial basis in 2023. To execute the BRSP, Bridgestone developed the playbook as an internal guide and shared it with global teammates.

More information about this initiative is available [here](#).

Box 12: GDSO's role in promoting tire connectedness

The Global Data Service Organisation for Tyres and Automotive Components (GDSO) is an international association open to every tire manufacturer. Its objective is to create a standardized data platform that enables the sharing of tire information, making data accessible to any stakeholder. It enables this through a unique item identifier. The work of

GDSO focuses on improving connectivity rather than intelligence – delivering a technology-agnostic approach that enables a more coordinated use of tire data. Such data-sharing systems could potentially play a role in enabling intelligent features and in improving circularity through the data and end-of-life management needs of specific tires.



Impact Pathway 7

Products and Services - Low-carbon, circular solutions and end-of-life tires



10.

10. Impact Pathway 7

Products and Services – Low-carbon, circular solutions and end-of-life tires: Advance innovation in product, service and business model design to enhance low-carbon and circular solutions while ensuring sustainable management of end-of-life tires (ELT) around the world.

Around 1 billion tires reach the end of their useful life as tires every year, with 60% of ELT recovered globally.¹⁰ Enhancing **circular and low-carbon solutions** in tire products and services is crucial to optimizing resource efficiency, minimizing waste generation and reducing the carbon footprint of tires. Tire products that have reached the end of their useful lives represent a valuable source of secondary raw materials for use as a feedstock in sectors including construction, asphalt and rubber product manufacturing.

Embedding circularity in the tire value chain starts at the product design, material use and material procurement phases. The materials used in tire manufacturing have potential environmental and human health impacts and the way products incorporate them can influence their end-of-life management. At the same time, even though recovery rates are improving in developed markets, there is still a need for increased recovery in less developed economies to address local environmental and public health impacts. We have committed to advancing product circularity and services via Impact Pathway 7 to address these different challenges.

The End of Life Tires (ELT) and the Sustainability Assessment Methods (SAM) Task Forces are advancing our ambition to enhance tire circularity and low carbon solutions. We actively collaborate in three main areas in this space.

1 Developing standardized definitions and methodologies for circularity and tire life-cycle impacts

Circularity metrics provide insights on companies' progress on eliminating waste and pollution, recirculating products and materials (at their highest value) and the efficient use of resources. To create a shared understanding and make performance measurable in a standardized way, our SAM Task Force is identifying and recommending a methodology and definitions to assess circularity in the sector. At the same time, the SAM Task Force is supporting the update of standards to assess the life-cycle impacts of tires and enable consistent evaluation of product environmental impacts, through the development of Product Category Rules (PCR). A PCR document

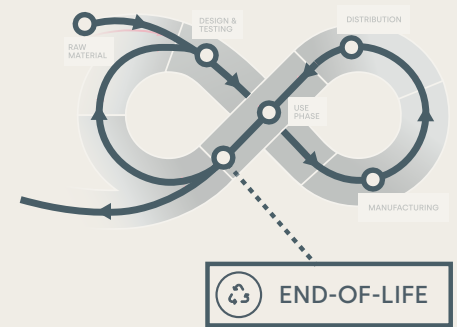
addresses the cradle-to-grave environmental impacts of tires, provides guidance for developing environmental product declarations (EPDs) for tires and pinpoints the underlying requirements of a life-cycle assessment according to ISO standards.

2 Promoting alternative materials and eco-design concepts to reduce potential impacts on human health or the environment

Addressing the root cause of tire waste requires designing tire products to optimize the potential for reuse and recycling once they reach the end of life. A better understanding of life-cycle impacts and collaboration with stakeholders can support the development and adoption of materials with lower environmental and human impacts, including secondary and bio-based materials. The work that the ELT and SAM Task Forces support can help inform members' individual strategies in these areas.

3 Driving new practices for tire end-of-life management

Since 2008, our ELT Task Force has supported extensive research on ELT management systems globally and is continually evaluating best practices, innovative methods and recovery rates. Notable recent work by the Task Force includes the *End-of-life tire (ELT) management Toolkit* (2021)



TARGET 8-4

Improve resource efficiency in consumption and production



TARGET 12-2

Sustainable management and use of natural resources



TARGET 12-5

Substantially reduce waste generation



and the *Perspectives on End-of-Life Tire (ELT) Management: Challenges and potential solutions in the US, Europe and China* report (2022). Both documents reflect our research into enhancing ELT management and recycling technologies and recommend best practices to promote recovery and establish more circular ELT management systems.

TIP members are each implementing specific initiatives and projects aimed at improving tire circularity along the whole value chain. Box 13 details some examples of member activities.

Box 13: Business examples - Low-carbon and circular tire solutions

Sumitomo

Sumitomo is actively working to advance innovation in product materials and to incorporate the Life Cycle Assessment (LCA) concept into their product design, with the aim of enhancing their environmental performance throughout the tire life cycle. The company has made continual progress in promoting LCA when it comes to raw materials, including the development of the world's first 100% fossil resource-free tires made from all-natural resources in 2013. In 2019, Sumitomo released ENASAVE NEXT III, the world's first tires to incorporate cellulose nanofiber, a high-performance biomass material. More recently, Sumitomo has launched a new circular economy business model for the company called TOWANOWA. The model aims to link two key business levers: sustainability and data. By using Sumitomo's Sensing Core technology, the company collects data throughout the entire tire life cycle and shares it with users and stakeholders along the value chain to improve tire sustainability performance.

More information about this initiative is available [here](#).

Continental

In 2022, Continental signed a development agreement with Pyrum Innovations, a specialist in the pyrolysis of ELTs, with the aim to further optimize and expand the recycling of tires through pyrolysis. Pyrum breaks down ELTs from Continental into their individual components in industrial furnaces using a special pyrolysis process. In this way, it can extract and recycle valuable raw materials contained in ELTs. During pyrolysis, Pyrum mainly recovers oil, gas and carbon from tires, which the companies can then use for various purposes, such as new raw materials employing pyrolysis oil. In the long term, Continental and Pyrum aim to establish a closed-loop circular economy concept for the recycling of old tires.

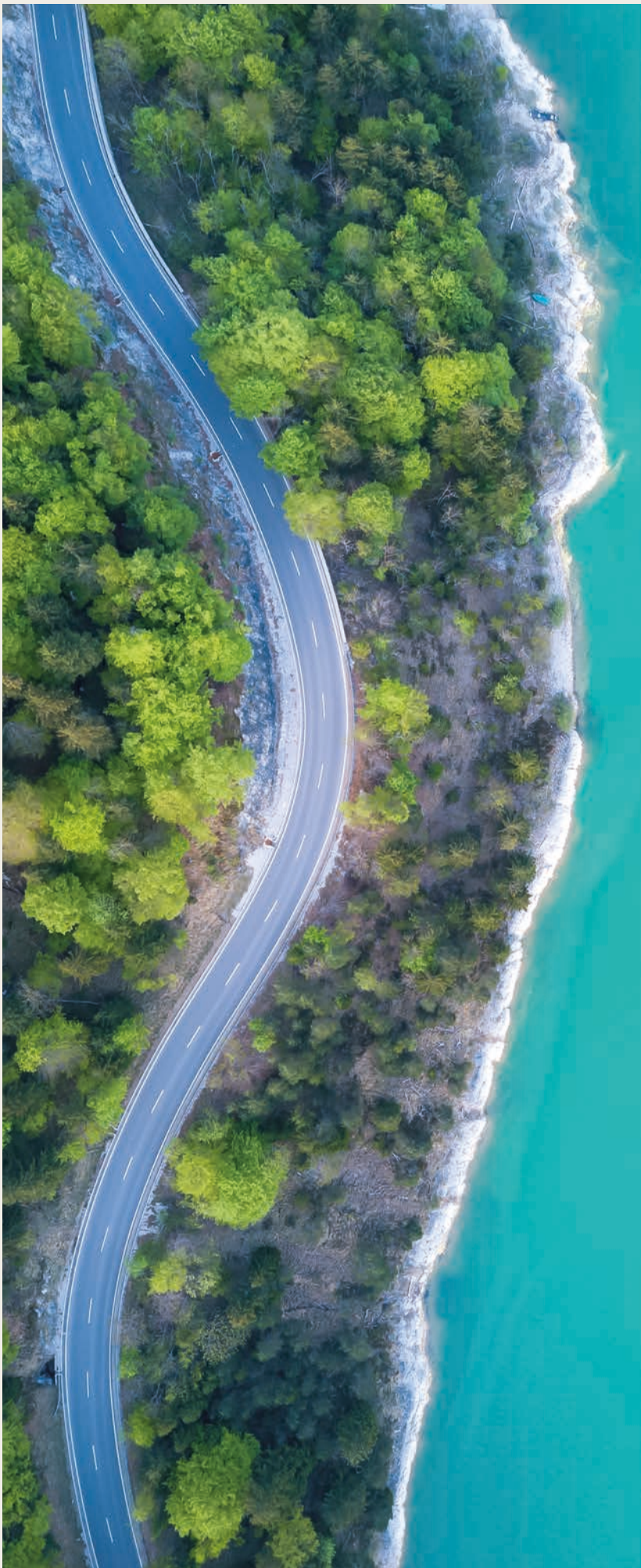
More information about this initiative is available [here](#).



Conclusion



11.



11. Conclusion

For our members, measuring and tracking progress against KPIs is critical to understanding the impact of the tire industry and allowing members to benchmark their performance and identify key areas for improvement.

Our yearly reporting against KPIs offers a growing set of industry data – now spanning 14 years – providing an increasingly long-term view of progress and future direction for our members. Nonetheless, TIP members also recognize that metrics may need to mature over time to reflect the changing context – including the topics on which they report, the increasing ambition of the industry, the prevailing mandatory requirements, and the rate at which they can make progress.


























In recognition of this need, this year we've worked to expand the range of KPIs against which companies report. The KPIs introduced are both quantitative and qualitative, assessing multiple dimensions of tire industry performance at different stages of the value chain and linking to a wide range of SDGs. This provides a more comprehensive account of TIP member progress on meeting the actions and SDGs identified in our SDG Roadmap.

We will continue to work to define metrics across different Impact Pathways with the support and collaboration of our Working Groups and Task Forces, and disseminating research and knowledge in international policy discussions such as the UN Plastic Treaty, as outlined in Figure 18.

We are introducing the new KPIs in the context of an ongoing effort to identify and monitor sustainability priorities and establish effective programs to accelerate their achievement. This includes a refresh of the 2019 SDG Roadmap and a review of progress along the roadmap to date. We are also working to evolve the structure of our reporting, organizing KPIs in closer alignment with Impact Pathways and, in turn, the SDGs. This will enable a better understanding of the industry's contributions to SDG attainment.

With this report, we acknowledge that monitoring company progress, individually and collectively, in their implementation of the SDG Roadmap will be critical to ensuring that the sector optimizes its contributions to the SDGs.

Figure 18: Defining metrics across different Impact Pathways

IMPACT OPPORTUNITY AREA									
	 Supply chain		 Operations		 Products & Services				
Impact Opportunity Focus	IP1 Natural rubber sustainability	IP2 Responsible sourcing	IP3 Operations, incl. manu- facturing	IP4 Employees	IP5 Tire and road wear particles (TRWP)	IP6 Sustainable mobility and digital solutions	IP7 Low-carbon circular solutions and end-of-life tires (ELT)		
Relevant SDG targets as identified in the roadmap	4.5 	8.4 	6.4 	5.5 	12.4 	3.6 	8.4 		
	8.4 	12.2 	9.4 	10.3 	12.6 	9.5 	12.2 		
	12.2 	12.6 	12.2 	10.4 		11.2 	12.5 		
				12.5 		12.2 			
Work Structure					Tire and road wear particle migration				
					UN Plastic Treaty/International Legally Binding Instrument on Plastic Pollution (ILBI)				
					Tire and road wear particles		End-of-life tires		
	Sustainability assessment methods				Sustainability assessment methods				
	Materials and chemicals								
	Key Performance Indicators								

12. Appendix

Methodological note

dss+ collected the 2022 data presented in this report on behalf of the Tire Industry Project (TIP). The reporting scope includes all the sites under TIP members' operational control – 241 sites in 2022. We did not perform any restatement of historical data in cases where companies closed sites, following the TIP Common Reporting Methodology. consolidated the data at 100% for all entities under operational control (regardless of the financial consolidation rate). We include the following premises and activities in the reporting scope: tire manufacturing sites and all related on-site activities (canteen, R&D, mixing, bladder production, reused tire processing, etc.) and standalone sites with mixing activities. We exclude other stand-alone sites (bladder production, steel cord, textile facilities, retread tire processing, HQ, offices, etc.). We also include offices in scope for the waste indicator.

We collected data on an individual-company basis, which dss+ later aggregated. dss+ and TIP members carried out a series of data quality checks to ensure quality and consistency with previous reporting years. We amended historical data only if a member identified an error a posteriori. We used the aggregated data to produce the figures and tables included in this report. Due to the Goodyear acquisition of Cooper Tire in June 2021, the consolidated results in this report for the historical period 2019-2021 are not always consistent with what we reported in previous versions of this report. This is due to updated historical data, following a data validation process as part of the integration of the two members.

The qualitative information reported is not exhaustive and the implementation of measures can vary both among and within companies.

Indicator definitions

The indicators historically reported in this report are based on the TIP Common Methodology, a reporting document that defines the indicators, scope and calculation methodology. All TIP members defined, evaluated and agreed on the new indicators reported for the first time in this report. We provide a summary of the indicators used in this report below.

Production is calculated as the weight of intended products to be sold to end-users as an output of the production lines, as well as the weight of new materials integrated in retread tires if this activity is in scope for the tire manufacturing plant.

Global Platform for Sustainable Natural Rubber (GPSNR): The percentage of TIP members that submit the mandatory policy reporting to the GPSNR for the corresponding reporting year.

Responsible sourcing policies: This key performance indicator (KPI) complements the indicator on GPSNR by tracking TIP member approaches to responsibly sourcing all materials, not just natural rubber. The KPI tracks responsible sourcing policies (RSPs) at multiple levels by assessing which members have policies and how they are using and enforcing these policies. This indicator tracks both the RSPs covering all materials sourced and policies covering a specific material.

Energy consumption: The energy consumption from different sources (e.g., electricity, gas, renewable energies) is consolidated in net calorific value (NCV) and measured in gigajoules (GJ). The electricity and steam sold to external third parties are deducted. Fuel consumption related to off-site transportation (employees, products) is excluded. Contractual arrangements for the purchase of renewable electricity such as Energy Attribute Certificates and Power Purchase Agreements are counted under "renewable electricity".

Energy intensity is weighted by production and is calculated by dividing the total energy consumed (in GJ) by the total production (in tons) in the same year.

Electricity derived from renewable energy is the electricity consumed using renewable sources, either self-generated or purchased (accompanied by energy attribute certificates or similar instruments), out of the total electricity consumed by TIP members. Only electricity consumption related to the tire manufacturing process and other facilities on the production sites is included in the scope.

Sources of emissions factors: Scope 1 emissions factors: 2006 Intergovernmental Panel on Climate Change (IPCC) guidelines for stationary combustion in the manufacturing industry. Scope 2 emissions factors associated with electricity purchases: International Energy Agency (IEA) Emissions Factors (2022). Data regarding electricity consumption was collected using the location-based method. This approach reflects the average emissions intensity of the grid, using a grid-average emissions factor.

CO₂ emissions are calculated by multiplying each energy source by its corresponding emissions factors (2006 IPCC guidelines for scope 1, IEA CO₂ emissions factors for scope 2). For residual emissions (i.e., emissions that remain after renewable certificates and contracts have been removed from the calculation), national grid average emissions factors have been used as

residual mix factors.

CO₂ intensity is weighted by production, which is calculated by dividing the total CO₂ emitted (in tons of CO₂ equivalent) by the total production (tons) during the same year.

Science-based targets (SBTs): This indicator calculates the percentage of TIP members who have: i) A validated science-based target for reducing their scope 1, 2 and 3 emissions that is consistent with 2 degrees of warming or less (well below 2 degrees or 1.5 degrees) or ii) have committed to developing a target by submitting a commitment letter to the Science Based Targets initiative (SBTi) between 1 January and 31 December of the reporting year. As per SBTi Recommendations, SBTs should cover all scope 1 and 2 emissions, and scope 3 emissions if the company's relevant scope 3 emissions are 40% or more of total scope 1, 2 and 3 emissions.

Water withdrawals represent the net amount of water entering the sites and withdrawn from any external source (pumping from natural resources, public networks, recycled water from external companies or from desalinization plants, etc.). All external sources of water withdrawals used for industrial, cooling and domestic use are taken into consideration, including the amount of water sold to off-site third parties or consumed by third-party companies on-site.

Water withdrawals from water-stressed areas: Total amount of water withdrawals at manufacturing plant level from areas with extremely high and high levels of water stress, as defined in the World Resources Institute (WRI) Aqueduct Water Risk Atlas, between 1 January and 31 December of the reporting year. Water withdrawals from areas with medium, low-medium (10-20%) and low (<10%) water stress are excluded.

Water intensity is weighted by production and is calculated by dividing the total water withdrawals by the total production (in tons) in the same year.

ISO 14001: The certification rate is calculated by dividing the total number of sites with ISO 14001 certification by the total number of sites. A site is recognized as being ISO 14001-certified during a given calendar year only if an external certificate is valid on 31 December of that year.

Waste: Waste is defined as all material generated unintentionally during production not resulting in a finished product on-site and legally considered as waste. Waste generated on-site by third parties (working within the physical perimeter of the facilities but not operated by a TIP company) is included in scope for this indicator. We consider the following as waste for the purposes of this report: office waste, waste electrical and electronic equipment (WEEE) from production sites and offices, sludges, defect tires never going back into the production chain, food waste resulting from canteens or restaurants on site, and hazardous wastewater removed by a third party.

Waste intensity is weighted by production and is calculated by dividing the total amount of waste generated (in metric tons) by the total production (tons) in the same year.

Health & safety (H&S) management system: Percentage of manufacturing sites covered by a health and safety management system (such as ISO 45001), that an external party has audited or certified, out of the total number of manufacturing sites, between 1 January and 31 December of the reporting year. It includes only manufacturing sites under the operational control of TIP members and only sites that have been successfully audited and verified to meet the standard in a given year. This indicator also discloses the percentage of TIP members who have internal auditing processes for H&S management systems.

Women on the Board of Directors: Percentage of women employees on the Board of Directors as of 31 December of the reporting year. It considers only employees as per the Global Reporting Initiative (GRI) 405 definition.

Women in the total workforce: Percentage of women employees in the total workforce (at group level) as of 31 December of the reporting year. It considers only employees as per GRI 405 definition. Non-employee workers (e.g., individual contractors) who are part of the company's workforce are excluded.

Diversity & inclusion (D&I): Percentage of TIP members with a public commitment to D&I over total number of TIP members during the reporting year 1 January to 31 December. The D&I commitment should include a clear statement of the company's values regarding diversity and be clearly visible on the company's website and in its annual report. It should also recognize a range of diversity and inclusion needs, rather than focusing on just one area.

Peer-reviewed research output on tire and road wear particles (TRWP): This indicator tracks: i) peer-reviewed literature output sponsored by TIP published in qualifying journals, examining topics related to TRWP and materials and chemicals related to TRWP and nanomaterials; ii) number of citations in peer-reviewed journals of peer-reviewed literature sponsored by TIP.

Endnotes

- ¹ Goodyear (2022). 2022 Corporate Responsibility Report. Retrieved from: https://corporate.goodyear.com/content/dam/goodyear-corp/documents/responsibility/Goodyear%20CRR_2022_FINAL.pdf.coredownload.pdf.
- ² European Tyre and Rubber Manufacturers Association (ETRMA) (n.d.). The Natural Rubber Supply Chain. https://www.etrma.org/wp-content/uploads/2022/05/ETRMA_The-Natural-Rubber-Supply-Chain-2022.pdf.
- ³ Proforest & Murphy, L. (2021). Environmental risk assessment of natural rubber production and processing.
- ⁴ James Griffiths & Associates (2020). Study on Human Rights and Labour Rights' Risk Mapping in the Global Natural Rubber Value Chains.
- ⁵ U.S. Tire Manufacturers Association (USTMA) (2018). Sustainability: Driving the U.S. Tire Manufacturing Industry. https://www.ustires.org/sites/default/files/USTMA_Sustainability_2018_1.16_PAGES.pdf.
- ⁶ CDP (2022). CDP Global Supply Chain Report 2022. Scoping Out: Tracking Nature Across the Supply Chain. Retrieved from: <https://cdn.cdp.net/cdp-production/cms/reports/documents/000/006/918/original/CDP-Supply-Chain-Report-2022.pdf>.
- ⁷ Waste includes the total waste generated from all industrial and administrative activities, as well as food waste from on-site catering facilities and waste electrical and electronic equipment (WEEE). It does not include construction and demolition waste. For more information on this KPI, see the Methodological note.
- ⁸ Kreider, M. L. et al. (2010). Physical and chemical characterization of tire-related particles: Comparison of particles generated using different methodologies. Science of the Total Environment, 408, 652-659.
- ⁹ Unice, K. M. et al. (2019). Characterizing export of land-based microplastics to the estuary - Part I: Application of integrated geospatial microplastic transport models to assess tire and road wear particles in the Seine watershed. Science of the Total Environment, 646, 1639-1649.
- ¹⁰ Tire Industry Project (2019). Global ELT Management – A global state of knowledge on regulation, management systems, impacts of recovery and technologies. Retrieved from: https://docs.wbcsd.org/2019/12/Global_ELT_Management%E2%80%93global_state_of_knowledge_on_regulation_management_systems_impacts_of_recovery_and_technologies.pdf.

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Disclaimer

This publication has been developed in the name of the World Business Council for Sustainable Development (WBCSD) Tire Industry Project (TIP). Like other TIP publications, it is the result of collaborative efforts by representatives from TIP member companies and external experts. TIP member companies reviewed drafts, thereby ensuring that the document broadly represents the perspective of WBCSD TIP membership. Input and feedback from stakeholders was incorporated in a balanced way. This does not mean, however, that every member company or stakeholder agrees with every word. The report has been prepared for general informational purposes only and is not intended to be relied upon as accounting, tax, legal or other professional advice.

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About the Tire Industry Project

Formed in 2005, the Tire Industry Project (TIP) is a voluntary CEO-driven initiative with a mission to anticipate, understand and address global environmental, social and governance issues relevant to the tire industry and its value chain. TIP acts by commissioning independent research of the highest standards, collaborating on sectoral solutions and engaging with external stakeholders. TIP currently brings together 10 leading tire companies that represent more than 60% of the world's tire manufacturing capacity.

TIP operates under the umbrella of the World Business Council for Sustainable Development (WBCSD).

About WBCSD

The World Business Council for Sustainable Development (WBCSD) is a global community of over 225 of the world's leading businesses driving systems transformation for a better world in which 9+ billion people can live well, within planetary boundaries, by mid-century. Together, we transform the systems we work in to limit the impact of the climate crisis, restore nature and tackle inequality.

We accelerate value chain transformation across key sectors and reshape the financial system to reward sustainable leadership and action through a lower cost of capital. Through the exchange of best practices, improving performance, accessing education, forming partnerships, and shaping the policy agenda, we drive progress in businesses and sharpen the accountability of their performance.

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