

# Global Fastener Leaders' Carbon Reduction Progress

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This article focuses on carbon emissions data and decarbonization strategies for fastener companies. It examines the latest ESG reports from companies across various countries, compiling emissions data into dedicated tables that offer insights into emission volumes and reduction targets. The tables categorize emissions as follows:

- **Scope 1:** Direct emissions from company processes, facilities, and transportation.
- **Scope 2:** Indirect emissions from purchased energy.
- **Scope 3:** Other indirect emissions across the supply chain, including business travel and product life cycles.
- **Overall total emissions** for each company.


Additionally, the article outlines these companies' decarbonization initiatives, highlighting their unique and innovative approaches to inspire reader brainstorming and foster discussions on novel emissions reduction solutions.

USA




Emission Unit: Million Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)	Target
Scope 1	16.53	15.57	-5.8%	Achieve a 50 percent reduction by 2030 compared to 2015 baseline. Net zero by 2050.
Scope 2	3.81	4.44	+16.5%	
Scope 3	48.15	53.96	+12.1%	
Sum	68.49	73.97	+8.0%	

- Collaborated with Caterpillar Inc. on the electrification of mining vehicles.
- Refinery of the Future project aimed at **developing technologies to reduce water and waste in refining, as well as reducing the emissions generated from the thermal energy** used in the refining process.




Emission Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)
Scope 1	13,293	13,574	+2.1%
Scope 2	11,997	18,151	+51.3%
Scope 3	951,943	999,031	+4.9%
Sum	977,233	1,030,756	+5.5%

- **Reduce the use of Hex chemicals and prohibit the use of polyvinyl chloride (PVC) as a packaging substrate.** Work with corrugated fiberboard and paperboard supplier partners.
- Integrate an industry leading sustainability software which is a cloud-based sustainability management platform that helps track, manage, and report on ESG performance.



Emission Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)
Scope 1	1,130	2,609	+130.9%
Scope 2	3,199	2,568	-19.7%
Sum	4,329	5,177	19.6%


- Use highly reflective building methods, with 72% of facilities featuring **climate-wise roofs that reduce heat absorption, cut energy usage,** and help combat urban heat island effects.
- Pallet/bucket reuse and recycling.



Emission Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)	Target
Scope 1	130,852	128,284	-2.0%	Reach net zero emissions by 2050
Scope 2	39,077	36,304	-7.1%	
Sum	169,929	164,588	-3.1%	


- Distribution centers utilize 100% renewable energy and **high-density automated storage and retrieval systems (ASRS) to maximize Sales Per Square Foot.** Eliminate non-specific inventory and walk-in areas, install high-density vertical shelving and pick modules for expanded capacity.
- Make reusable containers central to the distribution system to reduce consumption of cardboard, wood, plastic, and other shipping/packaging materials. Partnered with Trex Company to invest in baling equipment across distribution centers to **recycle pallet wrap into patio decks.**






Emission Unit: Million Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)	Target
Scope 1	6.8	6.9	+1.5%	GHG reduction target for 2030, aiming for 975 kg GHGs per metric ton of steel, inclusive of Scopes 1, 2, and 3 emissions.
Scope 2	5.7	5.8	+1.8%	
Scope 3	8.3	5.3	-36.1%	
Sum	20.8	18.0	-13.5%	

- **Investigating supersonic injection methods** to enhance the efficiency of melting materials to reduce the quantity of carbon material required per ton of steel. **Patented Low Copper Shred process** removes copper/tramp elements from obsolete scrap, enabling lower embodied carbon in steel products.
- **Invest in micro-mill technologies**, which eliminate the need for steel reheating by immediately rolling cast steel. Employ Electric Arc Furnaces to manufacture steel products by recycling scrap metal.




Emission Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)	Target
Scope 1	20,559	19,188	-6.7%	30% reduction in combined Scope 1 & 2 GHG emissions, and 45% reduction in water withdrawn by 2030.
Scope 2	65,028	66,543	+2.3%	
Sum	85,587	85,731	+0.2%	

- Invest in energy-efficient equipment like variable-speed air compressors and high efficiency boilers and HVAC systems. Install advanced electric injection molding machines, significantly reducing electricity consumption by up to 30% compared to hydraulic machines.
- Utilize variable frequency drives for chillers and compressors and “no-loss” condensate drains on compressor holding tanks to conserve use of compressed air. **Reduce energy consumption by establishing machine idling and leak tracking programs and processes.** Lower the temperatures of certain processes.




Emission Unit: Million Metric Tons CO2e	FY 2023	FY 2024	2023/2024 Change (%)	Target
Scope 1	0.26	0.26	0%	Achieve a 50% GHG emissions reduction in scope 1 and 2 emissions footprint and reduce absolute scope 3 emissions by 30% by 2030.
Scope 2	0.41	0.38	-7.3%	
Scope 3	17.95	17.68	-1.5%	
Sum	18.62	18.32	-1.6%	

- Completed an on-site solar installation at the Italy facility. The 1.5 megawatt solar installation represents a CO2 emissions reduction of 390 metric tons annually.
- Introduced a **closed-loop water cooling system**, further reducing water consumption.



Emission Unit: Metric Ton CO2e	FY 2024	FY 2025	2024/2025 Change (%)	Target
Scope 1	3,252	4,460	+37.1%	Reduce Scope 1 and 2 greenhouse gas emissions by 50 percent by 2031. Net zero by 2040.
Scope 2	2,891	3,612	+24.9%	
Scope 3	589,500	675,320	+14.6%	
Sum	595,643	683,392	+14.7%	

- Offer reusable or recycled fasteners. Collect and sort fasteners for recycling. Develop standardized fasteners for disassembly and reuse and help customers select them. **Use ultrasonic energy to create strong, adhesive-free fastener connections in lightweight materials within seconds—cutting carbon emissions** and boosting productivity.
- **Use 100% post-industrial recycled polypropylene (PP) for fastener production** as part of a new project. Optimize the product portfolio through AI-supported product range analyses to reduce the number of fasteners used.



Emission Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)	Target
Scope 1	2,132	1,936	-9.2%	Commit to eliminating internal greenhouse gas emissions to zero by 2030. Reduce greenhouse gas emissions in the value chain by 55 percent by 2031.
Scope 2	1,189	676,240	+56,774.7%	
Scope 3	841,084	---	---	
Sum	844,405	678,176 (Lacking scope 3)	Inadequate data	

- **Awarded EcoVadis Platinum Rating**, a trusted and independent provider of business sustainability ratings, evaluating companies’ performance across Environment, Labor & Human Rights, Ethics, and Sustainable Procurement.
- Recognized as one of the “World’s Best Companies in Sustainable Growth 2025” by TIME.





Emission Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)
Scope 1	41,780	40,548	-2.9%
Scope 2	50,119	50,542	+0.8%
Sum	91,899	91,090	-0.9%

- Advanced technologies such as **generative AI and large language models are being integrated into business processes.**
- OCEAN OYSTER system analyzes past production data to identify potential bottlenecks in advance, provides operators with corrective action suggestions, and directly contributes to operational decisions. It has an integrated AI infrastructure automatically detecting machine failures and quality issues and informing users.



Emission Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)
Scope 1	18,187	16,548	-9.0
Scope 2	6,690	4,955	-25.9
Scope 3	432,772	398,974	-7.8
Sum	457,649	420,477	-8.1

- Incorporate low-emission materials and optimize manufacturing processes. **Develop lightweight fasteners** and components to improve energy efficiency in the automotive and aerospace sectors.
- Products do not contain any water. All water withdrawals are either evaporated, discharged back to rivers and canals, or discharged to third parties via sewers or storage tanks.



Emission Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)	Target
Scope 1	27.547	24.328	-11.7%	Reach Carbon Neutrality by 2039
Scope 2	24.494	19.614	-19.9%	
Scope 3	158.947	169.372	+6.6%	
Sum	210.988	213.314	+1.1%	

- **Agrati University: specific courses to increase suppliers' technological level**, set closer relationship and develop stronger cooperation.
- **Organized the Sustainability Weeks in all plants, reaching all Agrati's employees**, in order to spread the value of sustainability in business and daily lives.



Emission Unit: Metric Ton CO2e	FY2023	FY 2024	2023/2024 Change (%)	Target
Scope 1	4,837	5,163	+6.7%	Reduce Scope 1 and 2 emissions by at least around 19.5% compared to 2017 by 2024.
Scope 2	227	30,794	+13,465.6%	
Scope 3	---	1,066,280	---	
Sum	5,064	1,102,237	+216.6%	

- NORMA **supplies eM Safe quick connectors for battery thermal management** in up to 90,000 annual EVs on a new US automaker's low-emission mobility platform starting 2027, featuring SAE-compliant, leak-proof Poka-Yoke design with dual O-rings.



Emission Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)
Scope 1	8,625	6,340	-26.5%
Scope 2	13,986	18,935	+35.4%
Scope 3	25,114	187,496	+646.6%
Sum	47,725	212,771	+345.8%

- Rawlplug's Wrocław HQ prototype **Agro PV (agrivoltaics) enables dual land use**—generating solar power above while growing crops below on 8m-high elevated panels with a gravity-fed rainwater retention system for irrigation and acid rain protection.
- Help reduce extraction of petroleum-based raw materials used to produce traditional plugs made of PP (polypropylene) or PA (polyamide) by **producing the Timber UNO plug from 70% wood sawdust.**



Emission Unit: Metric Ton CO2e	FY 2024	FY 2025	2024/2025 Change (%)	Target
Scope 1	21,164	25,053	+18.4%	Achieve CO2e neutrality (Scope 1 and Scope 2) in stages by 2030.
Scope 2	16,802	8,942	-46.8%	
Sum	1,411,302	1,375,653	-2.5%	

- Increased use of hydrotreated vegetable oil at Vossloh Rail Services and Vossloh Switch Systems instead of conventional diesel led to a total reduction in emissions of 126 tons of CO2 in 2025. **Examine the use of electrical curing technologies**, which could enable a transition from natural gas to low-carbon electricity in the future.
- Planning to electrify all its heating systems by switching from gas-based heating to electricity from renewable sources. Heat treatment process is to be electrified by converting the heat treatment furnace from gas to electricity.





Emission Unit: Metric Ton CO2e	FY 2024	FY 2025	2024/2025 Change (%)	Target
Scope 1	25,948.5	26,485.0	+2.1%	Reduce Scope 1 and 2 emissions by at least 90% by 2030. Reduce Scope 3 emissions by at least 90% by 2040.
Scope 2	27,262.3	21,478.3	-21.2%	
Scope 3	990,453.5	973,822.3	-1.7%	
Sum	1,043,664.3	1,021,785.6	-2.1%	

- Nantong (China) site's 7MW **solar-powered compressed air system**—with 20% more efficient centrifugal compressors and 40% more reliable controls—cuts 800 tons CO<sub>2</sub> emissions. Heerbrugg site's **briquetting presses** recovered 180,000 liters of oil and cut CO<sub>2</sub> emissions by 1,000 metric tons.
- Commissioned a 400 kW district heating pipeline at its Heerbrugg (Switzerland) site, transferring heat pump and compressed air waste heat to the neighboring SAW plant—delivering 800,000 kWh annually, replacing fossil fuel systems, and cutting CO<sub>2</sub> emissions by 150 metric tons.



Emission Unit: Metric Ton CO2e	FY 2024	FY 2025	2024/2025 Change (%)	2035 Target
Scope 1	1,578.39	1,447.35	-8.3%	Scope 1 and 2 emissions: down 67.20% to 2,676 tCO <sub>2</sub> e from 2019 baseline.
Scope 2	3,985.86	4,012.16	0.7%	
Scope 3	122,630.60	135,055.05	10.1%	
Sum	128,194.85	140,514.56	9.6%	

- Actively **focus on nearshoring initiatives to improve the resilience and environmental performance of its global supply chain**, including within its own manufacturing operations. Commenced on ongoing R&D to exceed the proposed ELV (end-of-life vehicles) Directive requiring all plastic components in motor vehicles to contain a minimal 25% recycled content by 2030.
- Set clear supplier expectations on quality, environmental impact, and ESG, enforced through desktop reviews and on-site audits by supplier quality team. Suppliers are re audited every two years through formal reviews and site visits.



Emission Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)
Scope 1	260,463	270,161	+3.7%
Scope 2	65,297	64,305	-1.5%
Sum	325,760	334,466	+2.7%

- Switched to bio-based HVO fuel** (Neste MY Renewable Diesel) at Campus Gaisbach starting February 2024, cutting lifecycle GHG emissions by up to 90% versus conventional diesel across all diesel vehicles.
- Würth Elektronik eiSos's Munich-Freiham High-Tech Innovation Center uses a geothermal heat pump powered by PV and green electricity to heat/cool the site, saving 160 tons CO<sub>2</sub>e annually. Baier & Michels' **b&m-ECCO TEC® cold forming technology** replaces chip-producing machining with chipless pressing/rolling for screws, cutting material use and product carbon footprint by ~67%.



Emission Unit: Metric Ton CO2e	2023	2024	2023/2024 Change (%)	Target
Scope 1 + 2	25,321	25,528	+0.8%	Reduced 12% CO <sub>2</sub> emission in fiscal 2025. Carbon neutral by 2050.

- Develop automation and electrification sectors** by selling high-value-added original fasteners. Replace energy-intensive plating processes with efficient cold forming, pressing, and diffusion joining of dissimilar metals for automotive battery parts.
- Self-tapping screws can be fastened into pre-drilled holes, forming threads as they are driven in. **Reducing self-tapping screws' processing steps** for customers to contribute to CO<sub>2</sub> reduction.



Emission Unit: Metric Ton CO2e	2023	2024	2023/2024 Change (%)	Target
Scope 1	182	168	-7.7%	Reduce CO <sub>2</sub> emission in fiscal 2030 by 46% compared with fiscal 2013.
Scope 2	1,061	664	-37.4%	
Scope 3	---	367,078	---	
Sum	361,016	367,910	---	

- Use Kansai Electric Power Company's renewable non-fossil fuel certificates for electricity consumption to reduce emissions by 403 tons. Reuse cardboard boxes for packaging and use returnable boxes.
- Nearly halved the number of commercial vehicles in possession. Use company-owned vehicles, rental cars or car-sharing, public transportation. **Sell eco-products that conserve resources, reuse and recycle, conserve energy, and eliminate hazardous chemical substances.**





Emission Unit: Metric Ton CO2e	FY 2024	FY 2025	2024/2025 Change (%)
Scope 1 + 2	28,777	35,677	+23.9%

- Old dated machineries had been replaced with the more **energy efficient machines** to reduced energy consumption. Production processes have been adjusted to enhance efficiency, reduce the usage of materials and lower its generation of production waste.



Emission Unit: Metric Ton CO2e	FY2023	FY2024	2023/2024 Change (%)
Scope 1	440	477	+8.4%
Scope 2	15,815	15,783	-0.2%
Scope 3	10,262	8,633	-15.9%
Scope 4	237,475	223,094	-6.1%
Sum	263,992	247,987	-6.1%

- **Replaced 3 inverter air conditioners, 2 refrigerators, and 1,045 energy-saving LED light tubes.**
- Wastewater generated must be treated first, and it can be discharged outside the factory only after reaching the effluent standards upon self-tests.



Emission Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)
Scope 1	13,215.5833	13,911.3719	+5.3%
Scope 2	15,875.1995	15,437.6736	-2.8%
Scope 3	266,774.4960	230,847.7218	-13.5%
Sum	295,865.279	260,196.767	-12.1%

- Conducted training for partner vendors on scheduling to optimize centralized transportation and reduce greenhouse gas emissions.
- Plan the installation of a second phase of solar panels. Implement smart meters for high-power and energy-intensive equipment to execute energy management and calculate production performance. **Develop green packaging and low-carbon transportation tools (electric forklifts) to reduce carbon emissions.**



Emission Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)
Scope 1+2 (Taiwan + China)	14,617.118	17,608.04	+20.4%

- Replacement of old and obsolete energy-consuming equipment, installation of solar panels at plant sites, replacement of Grade 3 energy efficiency motors with Grade 2 energy efficiency motors.
- **Install electrostatic precipitators to overcome smoke emissions during the manufacturing process.** Introduce highly efficient steam generators for the manufacturing process to save electricity consumption.



Emission Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)
Scope 1	165.426	154.059	-6.9%
Scope 2	3,797.830	5,261.040	+38.5%
Scope 3	---	479.207	---
Sum	3,963.256	5,462.306	+37.8%

- Implemented smart energy management systems to boost public facility electricity efficiency. **Coordinate production schedules and consolidate operations to cut standby energy waste.**
- Daily **inspections of compressed air valves with timely replacement of leaky old switches** to reduce compressor load from air leaks.



Emission Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)
Scope 1	1,288	1,472	+14.3%
Scope 2	9,003	7,828	-13.1%
Scope 3	1,274	2912	+128.6%
Sum	11,565	12,212	+5.6%

- Implemented server virtualization to reduce computing equipment electricity consumption and related equipment usage.
- Converted fuel boilers to gas boilers. Deployed **fully automatic slag separation/recycling machines for rapid waste separation**, lowering sludge moisture content and reducing waste volume.





Emission Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)	Target
Scope 1	1,709	1,813	+6.1%	25% reduction by 2030.
Scope 2	7,482	7,308	-2.3%	
Sum	9,191	9,121	-0.8%	

- **Joined green electricity group purchasing program**, committing to 17 million kWh over 5 years to diversify power sources and reduce carbon emissions.
- Prioritizing procurement of eco-friendly refrigeration equipment using non-ozone-depleting, low-GWP (Global Warming Potential) refrigerants to minimize ozone layer damage and greenhouse gas emissions.



Emission Unit: Metric Ton CO2e	FY 2023 (HQ)	FY 2024 (HQ + All Subsidiaries)	2023/2024 Change (%)	Target
Scope 1	350	509,268	+145,405.1%	Carbon neutral by 2050.
Scope 2	7,697	11,788	+53.2%	
Scope 3	7,164	9,090	+26.9%	
Scope 4	22,803	30,580	+34.1%	
Sum	38,014	560,726	+1,375.1%	

Note: Scope 4 = Indirect greenhouse gas emissions from the organization's use of products or services.

- **Circulate rinse water for screw heat treatment to reuse water from front and rear cleaning tanks**, saving 0.65 million liters annually. Zero wastewater discharge from product manufacturing.
- Prioritize low-carbon business travel and shipping routes for product export. Use IoT smart manufacturing process controls to boost production yield and on-time delivery rates.



Emission Unit: Metric Ton CO2e	FY 2023 (HQ + 3 Subsidiaries)	FY 2024 (HQ + 5 Subsidiaries)	2023/2024 Change (%)	Target
Scope 1	1,347.19	89,530.67	+6,545.7%	0.15% annual reduction starting 2025. 1% reduction by 2030.
Scope 2	9,762.30	73,097.32	+648.8%	
Sum	11,109.49	162,627.99	+1,363.9%	

- In 2024, data collected across all production sites showed environmental management spending increased 18% from NT\$ 7.87 million to NT\$150 million for continuous environment improvements.



Emission Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)	Target
Scope 1	1,507	1,649	+9.4%	Carbon neutral by 2050.
Scope 2	16,039	16,160	+0.8%	
Scope 3	234,613	191,215	-18.5%	
Sum	252,159	209,024	-17.1%	

- Solar power system now operational for self-generation and self-consumption, generating 716,052 kWh in total and saving 662,091 kWh in electricity (over 1% energy savings). Added variable frequency drives (VFDs) to production equipment with reduced operating frequencies to optimize energy efficiency.
- **Air pollutants filtered through wet scrubbers and pulse jet bag filters.** Oil-based waste is settled in centralized tanks for oil-water separation and recycling. Iron particles and chips from production are centrally managed and sold as scrap for market reuse once sufficient quantities accumulate.



Emission Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)	Target
Scope 1	419.1942	419.7866	+0.1%	20% reduction by 2030, 30% by 2040, carbon neutral by 2050.
Scope 2	11,733.1261	13,127.0277	+11.9%	
Scope 3	9,163.4479	3,766.6538	-58.9%	
Sum	21,315.7682	17,313.4681	-18.8%	

- Deploy smart meter monitoring platforms to enhance energy efficiency. Self-build solar power systems and obtain renewable energy certificates.
- **Low-temperature vacuum treatment facility for high-concentration waste acid/alkali** decomposes and distills waste, compressing sludge to reduce 80-100 tons of outsourced waste processing annually.

- Replaced 2 fixed-frequency air compressors with variable-frequency models. Phased out low-sulfur fuel boilers, reduced diesel boilers and converted to natural gas (no coal usage). **Switched coating diluents/agents to eco-friendly, non-regulated chemicals. Planning pollution control equipment to treat emissions from backwashing nitric acid scrubbers in the pickling plant to reduce air pollutants.**
- 90% of customers use simple packaging (vs. iron boxes for minority), slashing packaging costs by 80% with iron box/straps recycled. **Coordinate delivery schedules with customers, aiming to ship only when containers are fully loaded.** ■

