



2024 Update: Global Fastener Leaders' Carbon Reduction Progress

This article will focus on carbon emission statistics and carbon reduction strategies. First, it will examine carbon emissions from prominent public companies in the fastener industry across the United States, Europe, Japan, and India. It will gather carbon emission data from their latest published ESG reports and organize the data into separate tables to provide insights into their emission volumes and target-setting efforts. These tables will categorize emissions as follows: Category 1 includes direct emissions from a company's manufacturing processes, facilities, and transportation; Category 2 covers indirect emissions from purchased energy; Category 3 encompasses all other indirect emissions throughout the external supply chain, including those from business travel and product life cycles. It will also present the total carbon emissions for each company.

Furthermore, it will outline various carbon reduction measures implemented by these companies, with an emphasis on unique approaches. This focus on distinctive methods aims to inspire readers to brainstorm and foster discussions on innovative solutions for carbon reduction.

U.S.

FASTENAL®

Fastenal Emission				
Unit: Metric Ton CO2e	FY 2022	FY 2023	2022/2023 Change (%)	Target
Scope 1	132,879	130,852	-1.5%	Reach net zero emissions by 2050
Scope 2	40,074	39,077	-2.5%	
Sum	172,953	169,929	-1.7%	

- In-house transportation network (movement of goods from one location to the other of the same company) allows to control the movement of materials across much of the supply chain.
- Invest in the latest vehicle technology and by working to optimize routes, loads, and efficiency at every mile.



- Regularly review the latest fuel efficiency and safety options. Sell and replace a large portion of fleet annually. Ordering vehicles equipped with embedded telematics, which will provide local managers with visibility to the vehicles' fuel consumption and related data such as idling time, speed, and acceleration.

- Use geographic information systems (GIS) to map the most efficient truck routes. Analyze departure and arrival schedules to minimize delays caused by traffic in metro areas. Optimize load configuration to minimize non-utilized capacity. Back-haul freight from suppliers and also customers to minimize one-way or "deadhead" loads.

- Its Lacey, Washington distribution center used 100% wind energy in 2023.

- Participate in the EPA's Green Power Partnership to purchase and use solar and wind energy within its distribution centers and manufacturing locations.

- 11 of its 15 North American distribution centers are equipped with ASRS (high-density automated storage and retrieval systems) to increase throughput while optimizing space, maximizing 'Sales Per Square Foot'.

- Remove standardized (non-market-specific) inventory, reduce or remove walk-in shopping space, and use that square-footage to install high density vertical shelving. Implement "pick modules" to create a second floor of warehousing space, supporting thousands of additional products within the existing building.

- Create a less packaging-intensive distribution system, reduce the use of cardboard, wood, plastic, and other shipping/packaging materials, reduce unnecessary packaging.

- Partner with Trex to recycle used plastic wrap from distribution centers, transforming it into composite decking and preventing over 600,000 pounds of plastic waste from ending up in landfills in the first year of the program.



Alcoa Emission							
Unit: Million Metric Ton CO2e	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	2022/2023 Change (%)	Target
Scope 1	17.70	18.50	17.40	16.80	16.53	-1.6%	Achieve a 30 percent reduction by 2025 and a 50 percent reduction by 2030 compared to 2015 baseline. Net zero by 2050.
Scope 2	6.60	5.40	4.40	4.00	3.81	-4.8%	
Sum	38.75	40.64	47.45	49.57	48.15	-2.9%	
Emissions Intensity	6.96	6.06	5.41	5.32	5.17	-2.8%	

- Through EcoLum™, EcoSource™ and EcoDura™ products, it supplies lower carbon aluminum, lower carbon alumina and recycled aluminum made of pre-consumer scrap to customers.

- Engaged with Science-based Target initiative (SBTi) in defining decarbonization related disclosures and targets and will seek to join a SBTi's expert advisory group.

- Purchased approximately 292 terajoules of natural gas per day and supplemented self-generated power with 3.1 gigawatts of purchased electricity.

- Construct alkaline water impoundments using a composite-base high-density polyethylene (HDPE) liner or geosynthetic (or natural) clay, and install a second HDPE layer above the geosynthetic clay, as well as an underdrain piping system, which removes water from the bauxite residue more efficiently and reduces water pressure on the liner. This reduces the risk of alkaline water leaking into the groundwater.

- At sites where its mines operate within forest ecosystems, rehabilitation is focused on returning native vegetation to the habitat.

- The smelter in Deschambault has adopted a zero-water discharge system by recycling the water used in its processes and relying only on collected rainwater and snowmelt for the remainder of its water needs.



TriMas

TriMas Emission						
Unit: Metric Ton CO2e	FY 2020	FY 2021	FY 2022	FY 2023	2022/2023 Change (%)	Target
Scope 1	17,472	17,414	19,593	20,559	4.9%	30% reduction in combined Scope 1 & 2 GHG emissions, and 45% reduction in water withdrawn by 2030.
Scope 2	67,808	65,528	62,894	65,028	3.4%	
Sum	85,280	82,943	82,487	85,587	3.8%	
Scope 1 + 2 Emissions Intensity	0.111	0.097	0.093	0.096	3.2%	

- 100% of its locations that have industrial discharges have pretreatment systems to minimize pollutants sent to publicly owned treatment plants.
- Design products with recyclability and disassembly in mind, facilitating the recovery and reuse of valuable materials.
- 100% of its locations operate to the ISO 14001 Environmental Management System standard.
- Promote the use of the ISO 45001 Occupational Health and Safety Management Systems standard. Seek to operate to the ISO 50001 Energy Management System standard in its locations over time.

NUCOR®

Nucor Emission				
Unit: Million Metric Ton CO2e	FY 2022	FY 2023	2023/2022 Change (%)	Target
Scope 1	6.5	6.8	4.6%	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	5.0	5.7	14.0%	
Scope 3	8.8	8.3	-5.7%	
Sum	20.3	20.8	2.5%	
Emission Intensity	0.76	0.77	1.3%	

- Utilize injection carbon in steelmaking operations to provide additional energy for melting materials in electric arc furnaces. Investigate supersonic injection methods to enhance the efficiency of this process, aiming to reduce the quantity of carbon material required per ton of steel.
- Partner with Helion Energy to develop a groundbreaking 500 MW fusion power plant that will supply zero-carbon electricity directly to one of Nucor's steelmaking facilities.
- Partner with NuScale Power to explore using small modular nuclear reactors (SMRs) as a clean energy source for its electric arc furnace steel mills.

Europe

BOSSARD

Bossard Emission				
Unit: Metric Ton CO2e	FY 2021	FY 2022	2021/2022 Change (%)	Target
Scope 1	2,421	3,139	29.7%	Reduction of Scope 1 and 2 greenhouse gas emissions by 50 percent by 2031. Net zero by 2040.
Scope 2	3,458	2,553	-26.2%	
Sum	5,879	5,692	-3.2%	

- Suppliers are required to reduce their own greenhouse gas emissions and to focus on recycling and reusing materials, as well as to provide environmentally relevant certificates.
- Discussions are underway regarding the introduction of sustainable product lines to reduce the emissions of purchased products. These products would be made from green steel.
- Retrofit the headquarters building in 2024 and enlarge the percentage of renewable electricity.



- Prepare factsheets for warehouse managers containing information on the selection of suitable materials. Packaging should increasingly consist of reusable or biodegradable materials. When adding new products to the catalog in the future, a stronger focus will be placed on waste and recyclable materials.
- Bossard Germany's new film packaging is made 80 percent from recycled material. Stretch film optimization was successful, reducing packaging costs and cutting annual carbon emissions by approximately 2,530 kg.
- A survey was conducted among warehouse managers to determine the most frequently used packaging and the share of recycled base materials. The results of this survey will be used to develop a packaging factsheet designed to promote the selection of environmentally friendly packaging materials.
- Bossard's Supplier Code of Conduct requires suppliers to reduce emissions by recycling and reusing materials and products and by using environmentally friendly technologies. Suppliers also commit to handling waste responsibly. Regarding the handling, storage, disposal and transportation of chemicals, Bossard's suppliers are required to comply with international laws and keep the use of chemicals and hazardous substances to a minimum.



- Focus on a climate strategy centered around the countries with the highest emissions to mitigate the risks of climate change.
- Self-develop Corporate Carbon Footprint tool (CCF tool), a group-wide Excel tool for calculating climate footprint. Build a group-wide "climate management" digital training program for employees, broken down into five modules: climate basics, historical development, difference between CO2 and CO2e, climate footprints calculation, three scopes of the Greenhouse Gas Protocol in detail and how to calculate them using the CCF tool.
- Introduce climate round table "Let's talk about CLIMATE" where around 100 climate experts from Würth Group companies around the world meet here every six weeks to deepen their knowledge of climate management and clear up any unresolved questions in an open discussion.

Würth Emission				
Unit: Metric Ton CO2e	FY 2021	FY 2022	FY 2023	2022/2023 Change (%)
Sum	322,002	320,282	310,510	-3.1%

- Install 810 solar panels with a capacity of 375 kWp, delivering an annual output of up to 320,000 kWh.
- Products have to be designed so that they can be separated easily into their individual components in order to ensure various possibilities for reuse. Reduce the use of primary materials and increase the use of secondary materials to reduce the climate footprint. Reroute products and materials away from the landfill so that they can be reused as secondary raw materials.
- Create material passport which ensures that product data remains transparent. It contains information about material, social, and technical compliance, discloses the product components and their material properties up and down the supply chain, and includes indicators such as origin, toxicity of ingredients, and share of recycled materials.
- Würth Austria decided to establish a reuseable box system. The folding boxes can be palletized automatically, and the lids of the boxes can also be used as wrap-around packaging that, when combined with a securing strap, replaces the film wrapping of pallets.
- Potential future suppliers are checked for potential risks before a business relationship is established. The supplier auditor network audits and develops suppliers across the globe.



- Acquired 86.18 points in ESG rating (Top 10%).
- Submitted the first of the quarterly reports required by the initial phase of the regulation during FY24, relating to the quarter ended 31 December 2023.
- Waste and water continue to be managed through the ISO 14001 certification. Water consumption across the group has reduced 12% compared to the previous year. Commitment to reach global coverage by FY26.

Trifast Emission				
Unit: Metric Ton CO2e	FY 2023	FY 2024	2023/2024 Change (%)	2035 Target
Scope 1	1,723.20	1,578.39	-8.4%	Scope 1 and 2 emissions: 2,676 tCO2e, down 67.20% from 2019 baseline.
Scope 2	3,963.08	3,985.86	0.6%	
Scope 3	153,159.66	122,630.60	-19.9%	
Sum	158,845.94	128,194.85	-19.3%	

- Total energy use in FY24 was 18,769,707 kWh. Electricity makes up just over half of this, with the remainder being natural gas, oil, LPG used for space heating and transport fuel.
- Supply fastenings to customers in reusable plastic totes to reduce waste generation.



- Invest in product development and work with automotive customers to meet or exceed the proposed ELV (end of life vehicles) Directive which will require all plastic components in motor vehicles to contain a minimum of 25% recycled content by 2030.
- Use lead-free machining steels and materials which do not need heat treatment or coating to reduce carbon footprint and water usage. Enable manufacture through cold forming instead of machining to reduce the amount of waste of material from 60% to 5%.
- Require Approved Vendor List suppliers to implement Quality & Sustainability Agreement and Slavery & Human Trafficking Statement and provide declarations of compliance as part of the assessment process.
- No environmental controversies and no direct or accidental oil spillages in FY24.



- Joined the “Science Based Targets initiative (SBTi)”.
- Increased the share of self-generated electricity in the year under review and installed two new photovoltaic systems. Increased the share of self-generated electricity groupwide by 26.9% compared with the previous year.
- A wind turbine is to be built on SFS’s premises which should generate 5 GWh of electricity per year, which is roughly equivalent to the consumption of 1,300 households.

SFS Group Emission					
Unit: Metric Ton CO2e	FY 2021	FY 2022	FY 2023	2022/2023 Change (%)	Target
Scope 1	29,680	27,166	27,443	1.0%	Reduce Scope 1 and 2 emissions by ≥90% by 2030. Reduce Scope 3 emissions by at least 90% by 2040.
Scope 2	87,201	67,834	60,367	-11.0%	
Scope 3	411,417	620,185	1,048,811	69.1%	
Sum	528,298	715,185	1,136,621	58.9%	

- Employees in Hungary have insulated 20 pieces of machinery to utilize heat produced during the machinery’s uptime. The thermal insulation blanket now enveloping the machine has been able to shorten the machine’s warm-up period and cut energy consumption for each insulated machine by around 10%.
- Many forklifts still run on acid batteries or fossil fuels. At the Türkiye site, decision-makers opted last year to switch to newer models with lithium-ion batteries.
- All production halls at the Switzerland location have switched to energy-efficient LED lighting.



- Products are evaluated according to whether their materials are recyclable, whether the design is as light as possible and whether they take environmental requirements, such as those relating to hazardous substances, into account.
- As of December 31, 2023, 92.0% (23 of 25) of its manufacturing sites were certified according to ISO 14001, audited regularly every three years by external specialists.
- Develop quick connectors and thermal management systems which optimize the cooling and

Norma Emission				
Unit: Metric Ton CO2e	FY2022	FY 2023	2022/2023 Change (%)	Target
Scope 1	4,645	4,837	4.1%	Reduce Scope 1 and 2 emissions by at least around 19.5% by 2024 compared to 2017.
Scope 2	234	227	-3.0%	
Sum	4,879	5,064	3.8%	

- heating of batteries, as well as the complex power electronics, the drivetrain and other sub systems of EVs.
- Purchase “Energy Attribute Certificates”. For each megawatt hour consumed at each production site, a certificate is available which proves that the electricity was obtained from renewable energies.
- Solar panels were installed in China to reduce energy consumption and Group-wide ESG software has been introduced for general energy consumption management. Energy consumption is monitored on a monthly basis.
- Install water meters to monitor water consumption and modify certain production machines to reduce water consumption.
- Plastic waste is reintroduced into the manufacturing process as far as possible, depending on the type of plastic and reasonable costs. A certain portion of the resulting plastic waste is regranulated. Uses recycled and bio-based plastic materials in series production.



- Used water is reprocessed in its own plants and returned to the operating process, particularly in production areas that require a substantial amount of water. In some cases, the production units work with closed water circuits.

- Steel scrap and plastic are recycled at all sites. Use reusable transport containers.

- Use separate, safe disposal channels for each type of waste. The selected disposal companies are regularly audited. Where technically possible and sensible, closed cycles and reprocessing plants reduce the consumption of valuable new raw materials to a minimum.

Vossloh Emission				
Unit: Metric Ton CO2e	FY 2022	FY 2023	2022/2023 Change (%)	Target
Scope 1	19,318.8	20,685.3	7.1%	Achieve CO2e neutrality (Scope 1 and Scope 2) in stages by 2030.
Scope 2	25,533.8	21,646.8	-15.2%	
Sum	44,852.6	42,332.1	-5.6%	
Emission Intensity	42.9	34.9	-18.6%	

India



Sundram Fasteners Limited

- Maintain vast green belt areas of about 132 acres with more than 34,000 trees and more than 120 varieties of trees and plant species.

- Conduct annual supplier audits whose scope covers quality issues, system adherence, and manufacturing process.

- A well-established supplier rating system that provides ratings to its suppliers based on the criteria such as delivery and quality performance. Suppliers are classified at levels based on the scoring obtained.

- Currently developing a Supplier code of conduct based on the UNGC (United Nations Global Compact) principles.

Sundram Fasteners Emission					
Unit: Metric Ton CO2e	2021	2022	2023	2022/2023 Change (%)	Target
Scope 1	16,006	16,492	12,874	-21.9	Reduce 25% GHG emission by 2030. Carbon neutral operations by 2045.
Scope 2	75,749	115,248	129,453	+12.3	
Sum	91,755	131,740	142,327	+8.0	

- Implement use of electric forklifts instead of diesel counterparts to reduce diesel consumption.

- Planning to enhance the percentage of renewable energy consumption by solar power through rooftop solar plants and wind power.

- Implemented Zero Liquid Discharge across most of its business units, able to maximize recovery of water, reducing water withdrawal.

- Used oil is reclaimed from the processes and centrifuged to separate the residue and the oil. The oil is used back in the processes.

- Adopted the ISO 14001 environment management system. Certified across all the business units.

Japan



- Nearly halved the number of commercial vehicles in its possession, which was 237 in 2009, to 111 in March 2024 by reviewing surplus vehicles, sharing company-owned vehicles, using rental cars or car-sharing, and promoting the use of public transportation.

- Reuse cardboard boxes for packaging and use returnable boxes.

- Set a final landfill rate target of 1.2% or less and switched to industrial waste disposal contractors with higher recycling capabilities.

- Boost sales of eco-products. Currently developing products that use activated carbon (a material with countless minute holes) from bamboo as odor filters to contribute to the social problem of bamboo damage and CO2 emissions

Techno Associe Emission				
Unit: Metric Ton CO2e	2022	2023	2022/2023 Change (%)	Target
Scope 1	178	182	2.2%	Reduce CO2 emission in fiscal 2030 by 46% compared with fiscal 2013.
Scope 2	1,103	1,061	-3.8%	
Sum	355,757	361,016	1.5%	

- reduction. The process of making activated carbon from bamboo utilizes the CO2 thermal energy, resulting in zero CO2 emissions.

- Introduce “Renewable Energy ECO Plan” that makes use of Kansai Electric Power Company’s renewable non-fossil fuel certificates for electricity consumption (about 1,050 MWh per year), reducing CO2 emissions by 396 tons per year.

- Established and released “TECHNO ASSOCIE Environmental Standards”. Request understanding and compliance from suppliers. ■

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