



Carbon Reduction Progress of Global Fastening & Thread Cutting Tool Companies

全球緊固與螺紋切削工具企業減碳進度總盤點

This article will focus on carbon emission statistics and carbon reduction strategies. First, it will examine carbon emissions that we can find from fastening and thread cutting tool companies. It will gather carbon emission data from their latest published ESG reports and organize it into separate tables. These tables will categorize emissions as follows: Scope 1 includes direct emissions from a company's manufacturing processes, facilities, and transportation; Scope 2 covers indirect emissions from purchased energy; Scope 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 the 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.A.

Grainger Emission								Target
Unit: Thousands of Metric Ton CO2e	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	2022/2023 Change (%)	
Scope 1	37	35	32	35	31	30	-3.2	
Scope 2 (Market-based)	87	79	71	63	61	56	-8.1	
Scope 1 + 2	124	114	103	98	92	86	-6.5	
Intensity (Metric Ton CO2e / USD Million Revenue)	11	10	9	8	6	5	-16.6	Reduce global absolute Scope 1 & 2 emissions by 50% from a 2018 baseline by 2030.

GRAINGER

- ◆ Offer service range from consultative assessments, which help customers understand their current position and define a path forward to site-specific solutions that can help customers reduce energy, water and waste as well as improve air quality. Ranging from installing water bottle filling stations at schools to fitting electric vehicle charging stations at office buildings and conducting lighting retrofits in manufacturing facilities to reduce energy consumption.



- ◆ Currently have 7 megawatt direct current of solar panel installations at U.S. distribution centers and are working to install solar at the branches, resulting in more than 8,000 megawatt hours of renewable energy produced in 2023.
- ◆ **Leverage hydrogen fuel cell technology** to power the Powered Industrial Equipment (PIE), which reduces emissions and improves operational efficiencies by eliminating the need to charge batteries.
- ◆ Use Building Management Systems (BMS) to help achieve energy efficiency goals by monitoring a building's energy usage in real time and adjust as necessary for maximum efficiency.

Illinois Tool Works Emission						
Unit: Metric Ton CO2e		FY 2021	FY 2022	FY 2023	2022/2023 Change (%)	Target
Scope 1		137,315	138,029	128,092	-7.1	Achieve a 50% absolute reduction of Scope 1 and 2 emissions by 2030, compared with a 2021 baseline.
Scope 2	(Location-based)	399,545	395,793	381,425	-3.6	
	(Market-based)	297,851	284,500	154,136	-45.8	
Total Location-based Emissions		536,860	533,822	509,517	-4.5	
Total Market-based Emissions		435,166	422,529	282,228	-33.2	
Intensity (Metric Ton CO2e / USD Million Revenue)		30	27	18	-33.3	



- ◆ Partner with customers to develop clean-tech products— incorporate recycled material, such as post-consumer plastic, into manufactured products; support the growing electric vehicle (EV) and green building markets; sell testing solutions to customers that enable them to evaluate more sustainable materials for their own products (to enable lightweighting, for example). Provided more than USD 5 billion of clean-tech products, representing approximately 31% of ITW's revenue in 2023.
- ◆ Engaged in support of battery development for automotive and other end markets. **The ITW Performance Polymers' Plexus adhesives are used in EV battery assembly and support performance through their durability, light weight, thermal conductivity properties and environmental resistance.**
- ◆ ITW's Welding segment has reimagined welding technology by transitioning from transformer-based to inverter-based designs. This transition has significantly reduced the material weight of products, and in turn, conserves materials and cuts emissions in manufacturing and delivery.
- ◆ Rate and audit suppliers to evaluate their long-term viability and ability to support businesses sustainably by measuring a variety of factors, including safety and environmental measures, financial data, leadership stability and operational metrics.
- ◆ **Increase use of resins in Automotive OEM and Specialty Products segments with higher recycled content and lower GHG emissions in production.** Use electric arc furnace (EAF) steel mills when viable, which produce the cleanest recycled steel on the market.

Ingersoll Rand Emission							
Unit: Metric Ton CO2e		FY 2020	FY 2021	FY 2022	FY 2023	2022/2023 Change (%)	Target
Scope 1		46,922	45,584	42,978	44,126	+2.6	40,034 (-6.8%)
Scope 2	(Location- based)	66,190	69,162	63,333	58,414	-7.7	60,852 (-4.0%)
	(Market- based)	73,040	67,923	61,947	57,508	-7.1	57,704 (-6.8%)
Scope 3		154,619,271	173,702,022	211,542,718	218,554,078	+3.3	208,369,577 (-1.5%)





- ◆ **Launched a new on-site solar photovoltaic system. Any energy that is not used on weekends or holidays is redistributed to the electricity grid for use by the surrounding community.** The newly installed solar panels produce over 100% of the site's electricity requirements and save the facility 1,100 megawatt-hours (MWh) of electricity per year. In effect, this new system provides 100% electricity security independent of the grid.
- ◆ **Conduct phased-in replacement of the office and factory natural gas hot water systems with heat pump technology,** a new electric painting system that requires less energy consumption using new thinners and paints with low VOC emissions.

- ◆ Has rain-harvesting systems at manufacturing sites in Sahibabad, Coimbatore, Chennai, Naroda, and Bahadurgarh. The Naroda site harvested 4,681,377 gallons of water for re-use in 2023.
- ◆ **Developed a coolant recovery system that removes oil from used coolant and recycles it for continuous reuse.** It is also used for parts washers which use a cleaning fluid to remove grease and oil, where the water and cleaner is recycled. It avoids disposal of 250 gallons of non-hazardous material and is estimated to save the facility USD 10,000 per year, while providing easier maintenance and less clean up required.
- ◆ Convert recycled cardboard waste into packaging material through a cardboard perforator machine, replacing the previous method that involved a chemical foaming process and reducing the use of hazardous chemicals.



MSC Industrial Supply Emission			
Unit: Metric Ton CO2e	FY 2022	FY 2023	2022/2023 Change (%)
Scope 1	15,310.4	16,969.8	+10.8
Scope 2	27,082.4	36,892.5	+36.2
Scope 1 + 2	42,392.8	53,862.4	+27.0

- ◆ MSC and many key suppliers have **implemented carbide recycling programs at the grind shops.** Partnering with qualified recycling service providers to recover carbide from scrap and tools that can no longer be refurbished.
- ◆ Reused over 1,000 wooden crates and recycled 294,380 lbs. of metal from units that could not be refurbished.
- ◆ **Call2Recycle is a voluntary battery take-back program which allows customers and associates the opportunity to recycle single-use and rechargeable batteries.** Since 2018, MSC has recycled 364 lbs. of eligible batteries through Call2Recycle Battery Recycling.



Simpson Manufacturing Emission				
Unit: Metric Ton CO2e	FY 2021	FY 2022	FY 2023	2022/2023 Change (%)
Scope 1	4,150	6,971	3,886	-44.2
Scope 2	15,360	11,422	17,701	+54.9
Scope 1 + 2	19,510	18,393	21,587	+17.3

- ◆ Design tools and production dies to minimize material waste. Developed packaging that substitutes recyclable cardboard for plastic. Purchased bailers that collect and compact material. These bailers reduce the space required to house plastic recycling by 75%.
- ◆ Engineer products that heighten the safety during an earthquake and improve the likelihood that inhabitants will be able to return. **One of the primary considerations in developing new products is how to bolster structural resilience, enhancing the ability of buildings to endure weather events. Solutions are designed to facilitate quicker recovery.**
- ◆ **Offer products that mitigate the necessity for post-disaster demolition and reconstruction, thereby reducing carbon emissions.** Simpson Strong-Tie® Composite Strengthening Systems™ can be applied to reinforce structures weakened by natural disasters, or to upgrade existing buildings to meet new load requirements.
- ◆ **Acquired ETANCO and its innovative technology** that allows for the installation of façades on new or existing buildings, adding insulation that can cut energy consumption by up to 50%.
- ◆ **Quik Drive® allows for the installation of screws up to six times faster.** Quik Stik provides a versatile solution that makes fastening rafter and truss connections fast.





Snap-on Emission				
Unit: Metric Ton CO2e	FY2022	FY 2023	FY 2024	2023/2024 Change (%)
Scope 1	40,679	40,601	32,494	-19.9
Scope 2	61,126	58,421	56,591	-3.1
Scope 1 + 2	101,805	99,022	89,085	-10.0

- ◆ Manufacture products in the markets where they are sold and utilize local suppliers whenever possible to optimize supply chain efficiency.
- ◆ Closely monitor supplier relationships and communicate expectations clearly. **All suppliers must adhere to Snap-on's Supplier Code of Business Conduct.**
- ◆ Policies aimed at eliminating human trafficking, slavery, forced labor, and child labor from the global supply chain. These commitments align with the company's core values of integrity and social responsibility.

Stanley Black & Decker Emission				
Unit: Metric Ton CO2e	FY 2022	FY 2023	2022/2023 Change (%)	Target
Scope 1	116,846	104,121	-10.8	42% reduction in absolute Scope 1 and 2 GHG emissions by 2030.
Scope 2 (Market-based)	58,064	186,614	+221	
Scope 3	20,518,980	16,478,955	-19.6	
Scope 1 + 2 + 3	20,693,890	16,769,690	-18.9	
Carbon Intensity (Metric Ton CO2e / Thousand Hours Worked)	2.87	2.99	+4.1	

StanleyBlack&Decker

- ◆ Created a task force to work directly and regularly with top suppliers to drive efficiencies, process innovations, including through setting science-based Scope 1 and 2 targets of their own, and sharing methods to operationalize those commitments. **Through 2023, 20% of the suppliers have set Scope 1 and 2 targets.**
- ◆ DEWALT POWERSHIFT™ is designed to meet the critical needs of concrete professionals with power, runtime, and ergonomics that allow users to transition away from gas-powered equipment without compromising efficiency and performance.
- ◆ **Minimize the use of problematic plastics, specifically PVC and EPS, from all new product packaging and replace with cardboard.** Reducing the size of the redesigned packaging to use fewer materials and allow room for more products on customers' shelves. Exploring the use of durable, reusable containers for higher level of circularity.



Europe

Atlas Copco Emission				
Unit: Thousands of Metric Ton CO2e		FY 2022	FY 2023	2022/2023 Change (%)
Scope 1		84	86	+2.3
Scope 2	(Location-based)	140	142	+1.4
	(Market-based)	33	26	-30.3
Scope 3		233,197	250,528	+7.4
Scope 1 + 2 + 3 (Location-based)		233,421	250,756	+7.4
Scope 1 + 2 + 3 (Market-based)		250,640	233,314	-6.9
Scope 1 + 2 Intensity (Metric Ton CO2e / SEK Million Revenue) (Market-based)		0.79	0.65	-17.7
Scope 3 Intensity (Metric Ton CO2e / SEK Million Revenue)		1,451	1,624	+11.9



Atlas Copco

- ◆ The CP86 nutrunner enables the transition to a low carbon industry by offering customers an opportunity to replace a traditionally used pneumatic tool with an electric alternative. The lifecycle carbon impact per tool can be reduced by 96%, with savings of more than 12,000 metric tons of CO2e emissions per year.

- ◆ Mechanical Vapor Recompression (MVR) machines recover the high amount of available energy within waste vapor and boost this to a higher pressure for further process use. **Atlas Copco's new two-stage MVR compressor allows customers to reuse the low-pressure waste steam as an efficient energy source for the supply of medium-pressure steam back into their process**, significantly reducing the amount of natural gas used for steam production, as well as saving 17,600 metric tons of CO2e per year.
- ◆ Optimize packaging to reduce the amount of material needed, and to move away from plastic, by replacing the plastic filling bags with recycled paper. Where plastic is still needed, the aim is to use foils and straps made of more recycled materials.

Bosch Emission				
Unit: Thousands of Metric Ton CO2e	FY 2021	FY 2022	FY 2023	2022/2023 Change (%)
Scope 1	569	523	501	-4.2
Scope 2	338	194	80	-58.7
Scope 3 (In Millions of Metric Ton CO2e)	383.0	352.5	Undisclosed	Undisclosed
Intensity (Metric Ton CO2e / Euro Million Revenue)	11.53	8.13	6.34	-22.0



BOSCH

- ◆ 114 Bosch sites were already using solar power for their energy supply at the end of 2023. Generated around 149 GWh of renewable energy at Bosch in 2023.
- ◆ A new transport management system was introduced at Bosch in 2023, which enables cyclical strategic planning of the transport network and short-term operational planning of routes, modes of transport, and load quantities. The goal is to increase transport capacity utilization by truck from its current level of 65 percent to 80 percent in 2025 and thus reduce carbon emissions with this mode of transport by up to 10 percent.

- ◆ In the future, alternative drives and fuels will play an ever-greater role in reducing carbon emissions. Attention is focused on **strategic cooperation with logistics service providers in a bid to achieve short- and medium-term CO2 emissions reductions by using biofuels such as HVO100 and BioLNG** (a mix of liquefied natural gas and liquefied biomethane) or alternative drive technologies.
- ◆ Reducing air transport. Switch shipments destined for Bosch from air to sea or rail freight whenever possible.
- ◆ **Plastics with a 25 percent recycling content and steel with a 50 percent recycling content were chosen as materials for packaging the finished product.**
- ◆ The Bosch eXchange program has been offering customers the option to have defective vehicle components replaced with remanufactured products at specialist workshops, saving 3,100 metric tons of material, which is the equivalent of around 8,600 metric tons of CO2.

Hilti Emission						
Unit: Metric Ton CO2e		FY 2022	FY 2023	FY 2024	2023/2024 Change (%)	2050 Target
Scope 1		75,848	75,242	64,369	-14.4	7,585
Scope 2	(Location-based)	47,737	46,884	51,387	+9.6	Undisclosed
	(Market-based)	167	968	978	+1.0	17
Scope 3		1,526,441	1,361,409	1,279,365	-6.0	152,644
Scope 1 + 2 + 3	(Location-based)	1,650,026	1,483,535	1,395,120	-5.9	Undisclosed
	(Market-based)	1,602,456	1,437,619	1,344,711	-6.4	160,246
Intensity (Metric Ton CO2e / CHF Million Revenue)	(Location-based)	Undisclosed	228	217	-4.8	Undisclosed
	(Market -based)	Undisclosed	220	209	-5.0	Undisclosed





- ◆ **Hilti's Fleet Management Model and On!Track solution help customers optimize tool usage and inventory and avoid overconsumption.** By enabling efficient asset tracking and inventory management, these services decrease the demand for new tools, lowering both resource inflows and outflows.

- ◆ **Spare parts from returned tools are extracted and reused to reduce the need for new parts** where possible.
- ◆ A new circularity-focused repair center is expected to be completed in the first half of 2025. With this facility Hilti intends to meet at least the gold certification criteria of the German Sustainable Building Council and support its sustainability and reuse targets.
- ◆ Use polymers, cardboard, paper and wood for packaging, focusing on sustainable sourcing and recyclability.

Knipex Emission						
Unit: Metric Ton CO2e	FY 2020	FY 2021	FY 2022	FY 2023	2022/2023 Change (%)	Target
Total Emission	19,824	24,393	19,295	13,219	-31.4	Halve greenhouse gas emissions by 2030.
Intensity (kg CO2e per plier)	1.48	1.58	1.15	0.79	-31.3	



- ◆ Converted all furnaces in Hardening Plant II to the latest generation of efficient, hydrogen-capable burners.
- ◆ Will switch further steel grades to lower-emission steels.
- ◆ Transport pliers to customers by opting for climate-neutral or climate-friendly shipping wherever possible.
- ◆ **Converted the previous linear steel and scrap route into a cycle.** The burr scrap generated during pliers production is now transported directly to the steelworks by the disposal company and melted down there to produce new pliers steel. In addition to eliminating transport routes, this method increases the degree to which the scrap is recycled and also reduces the need for alloying elements.

- ◆ **Switch completely to green electricity and biogas in production.**



Hitachi Emission					
Unit: Metric Ton CO2e	FY2022	FY2023	FY2024	2023/2024 Change (%)	Target
Scope 1	1.27	0.49	0.40	-18.3	Carbon neutral by 2030.
Scope 2	2.14	1.08	0.28	-74.0	
Scope 3	67.34	267.67	213.70	-20.1	
Scope 1 + 2 + 3	70.75	269.24	214.38	-20.3	

HITACHI

Inspire the Next

- ◆ Introduce energy-saving and renewable energy equipment. Procure 100% non-fossil electricity across all business sites.
- ◆ **Hitachi Industrial Equipment Systems' air compressors reduce**

CO2 emissions by improving energy efficiency through enhanced performance of the compressor unit and increased efficiency of the motor.

- ◆ **Provide electrification systems for mining dump trucks**, where an engine drives a generator that produces electricity for driving and control, thereby improving the driving and control performance of the vehicles and helping to reduce CO2 emissions.
- ◆ **Created a fleet management plan to prepare for fleet electrification.** AI drive recorders are used to visualize vehicle operating conditions, followed by an analysis of collected driving data and CO2 emissions monitoring. The results of this analysis and monitoring are used to reduce CO2 emissions from existing vehicles and advance the gradual replacement of existing vehicles with electric vehicles.



Makita Emission				
Unit: Metric Ton CO2e	FY 2022	FY 2023	FY 2024	2023/2024 Change (%)
Scope 1	20,930	21,401	19,725	-7.8
Scope 2	57,969	44,132	37,346	-15.3
Scope 3	7,264,652	5,556,933	3,933,618	-29.2
Scope 1 + 2 + 3	7,343,551	5,622,466	3,990,689	-29.0



- ◆ **Switched from conventional to biomass plastic bags in product packaging.** Considered introducing recycled resin materials and began to install a portion of bags and cases made from these materials.

- ◆ Biomass materials are used in the Model GA9060 series motor housing cover. Increase products' power and life by increasing the capacity of new technology motors (the DC brushless motor) and batteries, improving motor efficiency, and reducing the size and weight of power components that affect the mass of products.
- ◆ As a recycling member of JBRC (Japan Portable Rechargeable Battery Recycling Center), voluntarily collecting and recycling small secondary batteries.
- ◆ **Not storing PCB (polychlorinated biphenyl) waste.** Systematically dispose of low-concentration PCB-contaminated waste electrical equipment that is generated when transformers and other power receiving equipment are upgraded.

OSG Emission					
Unit: Metric Ton CO2e	FY 2021	FY 2022	FY 2023	2022/2023 Change (%)	Target
Total	41,975	48,292	42,294	-12.4	Carbon neutral by 2050.
Intensity (Metric Ton Per Unit of Production)	0.93	0.90	0.83	-7.7	



- ◆ OSG used to have a separate tank for each grinder, which led to coolant pumps operating even when the equipment was shut down. Two things were done to optimize this situation. The first was to change out the oil pump motor to an energy-efficient one and install a fixed discharge pressure inverter control. The second change was to align the flow rate control with equipment operation as the filtration system is linked to an operation monitor.
- ◆ **Recycle carbide products.** Recover used tools from customers and recycle the rare metals.
- ◆ **Offer reconditioning and recoating services** for taps, end mills, drills, and other cutting tools.



Taiwan

Mobiletron Emission					
Unit: Metric Ton CO2e	FY 2021	FY 2022	FY 2023	2022/2023 Change (%)	Target
Scope 1	64.1	101.5	266.2	+162.2	Carbon neutral by 2050.
Scope 2	1,883.5	1575.3	1,663.7	+5.6	
Scope 3	Undisclosed	280.8	327.5	+16.6	
Scope 1 + 2 + 3	1,947.6	1,957.6	2,257.4	+15.3	



- ◆ Goals: Develop high-performance, high-power-density brushless motor smart tools, and complete the development of Battery Thermal Management System (BTMS) to extend EV battery life by 30% by 2024. Develop an active balancing Battery Management System (BMS) to achieve energy-saving, carbon reduction, and carbon neutrality goals by 2030.
- ◆ Actively require and assist suppliers to ensure their products comply with the Supplier Declaration Guarantee, promising that their products are "free of hazardous restricted substances (HSF)." The supplied products must meet relevant environmental regulations such as RoHS, WEEE, ELV, PAHs, REACH, and CP65 to align with green product supply chain standards.
- ◆ **Utilize active battery balancing management technology for recycling and repurposing batteries as energy storage devices.** Depending on their storage capacity, these batteries can be applied to various EVs, base stations, home energy storage systems, commercial energy storage



systems, remote/offshore energy storage systems, charging stations, and replacing lead-acid batteries in forklifts. This approach extends and broadens battery applications while achieving value-added green energy circular economy design.

- ◆ **Focus on developing products with digital single-chip control.**
- ◆ Install flow and pressure sensors in air compression equipment pipelines to monitor leakage sources in real-time and reduce ineffective energy consumption during idle operation. Additionally integrate a self-developed cloud-based product called the "IoT Integrated Communication Platform," enabling real-time system anomaly monitoring and remote configuration through a mobile app.

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Proxene Tools Emission		
Unit: Metric Ton CO2e	FY 2023	2022/2023 Change (%)
Scope 1	439.7	Incomparable due to lack of previous years' data.
Scope 2	846.1	
Sum	1285.8	

- ◆ Committed to enhancing the efficiency of resource utilization, such as waste sorting and recycling. Partner with qualified companies to recycle various types of waste. Promote the use of both sides of paper for documents and the reuse of recycled paper to reduce paper consumption and minimize waste.
- ◆ **Water usage in 2023 decreased by approximately 874 tons compared to the previous year.**
- ◆ Encourage the classification and recycling of waste, as well as use reusable utensils and cups to reduce environmental impact. ■

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