

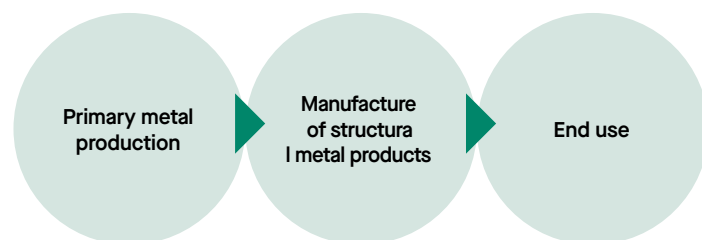
Manufacture of structural metal products

CLIMATE & EFFICIENCY INVESTMENTS



Decarbonising the manufacture of structural metal products: A strategic imperative

By 2050, global demand for structural metal products is projected to increase significantly, driven by infrastructure expansion, urbanisation, and energy transition. With over 1.8 billion tonnes¹ of crude steel produced annually, the sector operates at immense scale while contributing an estimated 7-9% of global energy related CO₂ emissions². Given this footprint, decarbonising structural metal manufacturing is essential to avoid locking in decades of high emissions. Deep decarbonisation requires scaling scrap recycling, expanding renewable powered electric arc furnaces, deploying green hydrogen production routes, and improving material efficiency.



Manufacture of structural metal products

The manufacture of structural metal products involves turning steel and other metals into load bearing components for buildings, bridges, and infrastructure. Production relies heavily on electricity, with additional energy inputs like natural gas used for thermal cutting, heat treatment, and coating processes.

From a greenhouse gas perspective, the manufacture of structural metal products generates both **Scope1 emissions** from on site fuel combustion in cutting, welding, and heat treatment processes and **Scope2 emissions** from purchased electricity used to power fabrication equipment and facility operations.

Key emissions drivers in the manufacture of structural metal products

Scope 1 – Direct emissions

Scope1 emissions in the manufacture of structural metal products mainly stem from on site fuel combustion in fabrication processes and fuel use in on site mobile equipment.

Scope 2 – Indirect emissions

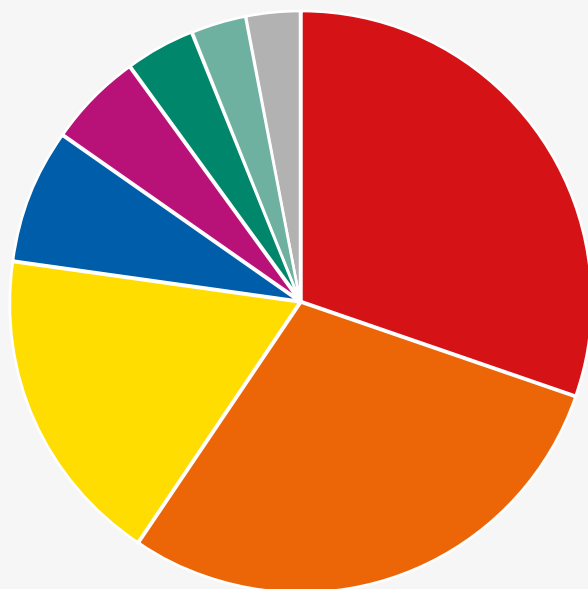
Scope2 emissions in the manufacture of structural metal products arise from purchased electricity used to power fabrication equipment and other auxiliary systems.



¹ World Steel in Figures 2025 - worldsteel.org

² Iron and Steel Technology Roadmap – Analysis - IEA

Key CO₂ emissions drivers Manufacture of structural metal products



Key emissions drivers²

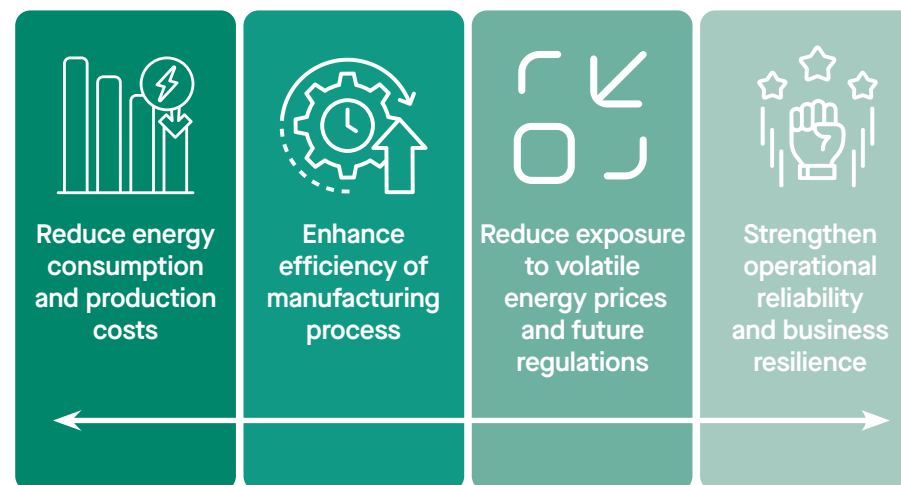
- Machine drive 30.3%
- Process heating 29.3%
- Facility HVAC 17.6%
- Facility lighting 7.6%
- Others 5.2%*
- Electro-chemical processes 4%
- Process cooling and refrigeration 3%
- CHP and/or cogeneration process 2.9%

* Other facility support 2.2%, Other process use 1.6%, Onsite transportation 0.5%, Conventional boiler use 0.4%, End use not reported 0.3%, Other non-process use 0.2%, Conventional electricity generation 0%

Why decarbonisation matters

Reducing on-site emissions and improving energy efficiency offers structural metal product manufacturers a way to cut costs, manage regulatory and fuel price risks, and boost long-term resilience. Metal production relies heavily on fuels and electricity, making energy a key driver of both emissions and operating expenses. Upgrading equipment, recovering waste heat, and integrating renewable energy can lower emissions while improving efficiency and competitiveness.

By reducing Scope 1 and 2 emissions, manufacturers of structural metal products can:



Decarbonisation Roadmap

Manufacture of structural metal products				
Investment measure	Energy cost savings (%)	Payback period (years)	CO ₂ reduction potential	Benefits
CHP combustion engine	20%	3 - 4	✓	Combined heat and power (CHP) engines generate electricity and heat from a single fuel, boosting efficiency, reducing energy waste, and lowering emissions. When powered by low-carbon fuels like biogas or hydrogen, they further support a cleaner energy system.
CHP gas turbine	20%	3 - 4	✓	CHP gas turbines support net-zero goals by generating electricity and capturing waste heat, boosting efficiency. Powered by low-carbon fuels like biogas or hydrogen, they reduce emissions while providing reliable power and heat.
CHP fuel cell	20%	3 - 4	✓	CHP fuel cells support net-zero goals by generating electricity with high efficiency and supplying useful heat. Their low carbon intensity, quiet operation, and low maintenance enhance energy efficiency compared to conventional combustion systems.
Surface treatment machines	20%-30%	7 - 8	✓	Surface treatment machines deliver precise, consistent finishes on metal components. Their energy-efficient design reduces power consumption and material waste, lowering operating costs. Cleaner processes and reduced emissions support sustainable manufacturing.
Battery electric vehicles (BEVs)	50%	5 - 6	●	Electric vehicles offer higher energy efficiency through advanced battery systems and regenerative braking, reducing overall energy consumption during operation. They offer a clean solution for transporting products, reducing fuel costs, and improving operational sustainability.
Electric forklifts	50%	2 - 3	●	Electric forklifts are battery-powered material-handling vehicles used to move ingredients and finished products within bakery facilities. They offer high energy efficiency by converting stored electrical energy directly into motion with minimal losses. This efficiency reduces fossil fuel costs and CO ₂ emissions.

CO₂ reduction potential ● Very low ● Low ● Medium ✓ High

Decarbonisation Roadmap

Investment measure	Energy cost savings (%)	Payback period (years)	CO ₂ reduction potential	Benefits
Loaders	25% - 45%	4 - 5	●	Energy-efficient loaders contribute to lower greenhouse gas emissions, reduced noise pollution, compliance with stricter emissions regulations, and overall cost reduction through lower fuel and maintenance expenses.
PV self-consumption	Up to 100% based on the system capacity and electricity demand	6 - 7	✓	A PV (photovoltaic) system converts sunlight into electricity for on-site use. It provides clean, renewable energy to power production, refrigeration, and other operations, reducing reliance on grid electricity and lowering operational costs. Pairing a PV system with battery storage enables multi-shift companies to rely on renewable electricity while reducing exposure to electricity price volatility.
Li-ion batteries	Case-specific	4 - 8	Case-specific	Lithium-ion (Li-ion) batteries are energy storage systems that store electricity and release it when needed. Their energy-saving potential comes from maximising the use of on-site renewable electricity, reducing reliance on grid power during peak periods. This delivers tangible cost savings through improved energy management and lower operating expenses.
Industrial process chiller	20% - 30%	Over 10 years	✓	Industrial process chillers provide precise temperature control to maintain product quality and protect equipment. Their efficient operation reduces energy consumption, promoting more sustainable operations.
CNC milling machines (Metal)	10% - 15%	Over 10 years	●	CNC milling machines shape metal with high precision using computer-controlled cutting tools. They are energy-efficient, reducing power consumption and lowering operational costs. By optimising energy use and integrating renewable power, CNC milling supports sustainable manufacturing.
Laser cutting machines (Metal)	10%-20%	Over 10 years	●	Laser cutting machines use focused laser beams to cut and shape metal with high precision. They are energy-efficient, lowering electricity use and production costs compared to traditional cutting methods. By using renewable energy and efficient processes, laser cutting contributes to greener manufacturing.
Horizontal CNC lathes	15%	Over 10 years	●	Horizontal CNC lathes precisely machine metal by spinning the workpiece against cutting tools. They operate with high energy efficiency, lowering electricity usage and production expenses. When paired with renewable energy, these machines help reduce emissions and support eco-friendly manufacturing.

CO₂ reduction potential ● Very low ● Low ● Medium ✓ High

Investment measure	Energy cost savings (%)	Payback period (years)	CO ₂ reduction potential	Benefits
Water source heat pumps	20% - 30%	Over 10 years	●	Water source heat pumps are systems that use water as a medium to efficiently transfer heat for heating and cooling. They help companies reduce energy consumption and operational costs while lowering greenhouse gas emissions.
Air-to-air heat pumps	15% - 25%	Over 10 years	●	Air-to-air heat pumps provide efficient heating and cooling by transferring energy rather than generating it. Their high efficiency reduces electricity consumption, contributing to more sustainable building operations.
Air-to-water heat pumps	10% - 20%	Over 10 years	●	Air-to-water heat pumps are systems that extract heat from the air to provide efficient heating and hot water. They help companies reduce energy use, cut costs, and lower emissions.
Ground source heat pumps	15% - 25%	Over 10 years	●	Ground source heat pumps are systems that use the stable temperature of the ground to provide efficient heating and cooling. They help companies reduce energy consumption, lower costs, and cut greenhouse gas emissions.
Ventilation system	10% - 20%	Over 10 years	●	A ventilation system manages the flow of air by bringing in fresh air and expelling stale or contaminated air to maintain a healthy indoor environment. By reducing energy use and improving air quality, efficient ventilation systems support lowering a facility's overall carbon footprint.
Building insulation materials	50%	4 - 5	✓	Building insulation reduces heating and cooling costs, boosts energy efficiency, and supports decarbonisation by lowering emissions and environmental impact.
LED lighting	5% - 10%	5 - 6	●	LED lighting provides high-efficiency illumination with lower energy consumption compared to conventional lighting solutions. Its reduced electricity demand supports decarbonisation and enhances building performance.

For more detailed information on how to reduce costs and lower your CO₂ footprint, along with additional measures tailored for your business, contact the bank.

