

Which automakers are shifting to green steel?

An analysis of steel supply chains and future commitments to fossil-free steel

The steel industry is responsible for 7% of global greenhouse gas (GHG) emissions, equivalent to the total GHG emissions of the European Union.¹ Reducing steel's climate impact requires shifting from traditional coal-based steelmaking to fossil-free technologies, including furnaces powered by green hydrogen and renewable energy. Scaling up fossil-free steelmaking capacities will require significant upfront investments. Automakers can provide the investment security needed to support this shift by making commitments to purchase green steel.

The auto industry is the second-largest consumer of steel, procuring 12% of global steel, 17% of steel in the European Union, and 26% of steel in the United States. Most of this is high-quality primary steel, rather than recycled steel, putting the automotive sector in an ideal position to drive transformation. The International Energy Agency projects that the steel sector globally needs to reduce GHG emissions by 25% by 2030 to be on a pathway to reach net-zero emissions by 2050.³ Automakers can support this transition by committing to procure fossil-free steel for at least 25% of all steel purchases in 2030. These commitments come at a minimal cost to automakers. Switching to 100% fossil-free steel would increase vehicle purchase prices by less than 1%.

The International Council on Clean Transportation (ICCT) analyzed the global supply chain networks and GHG emissions intensity of steel supplied to the **17 major automakers selling vehicles in Europe and North America**. The analysis compares the automakers' commitments to procure fossil-free steel in future. The report concludes with insights on how to boost investments in fossil-free steel for the automotive industry.

Automotive steel, typically produced with coal, is responsible for up to **27%** of the embodied manufacturing emissions of a vehicle.

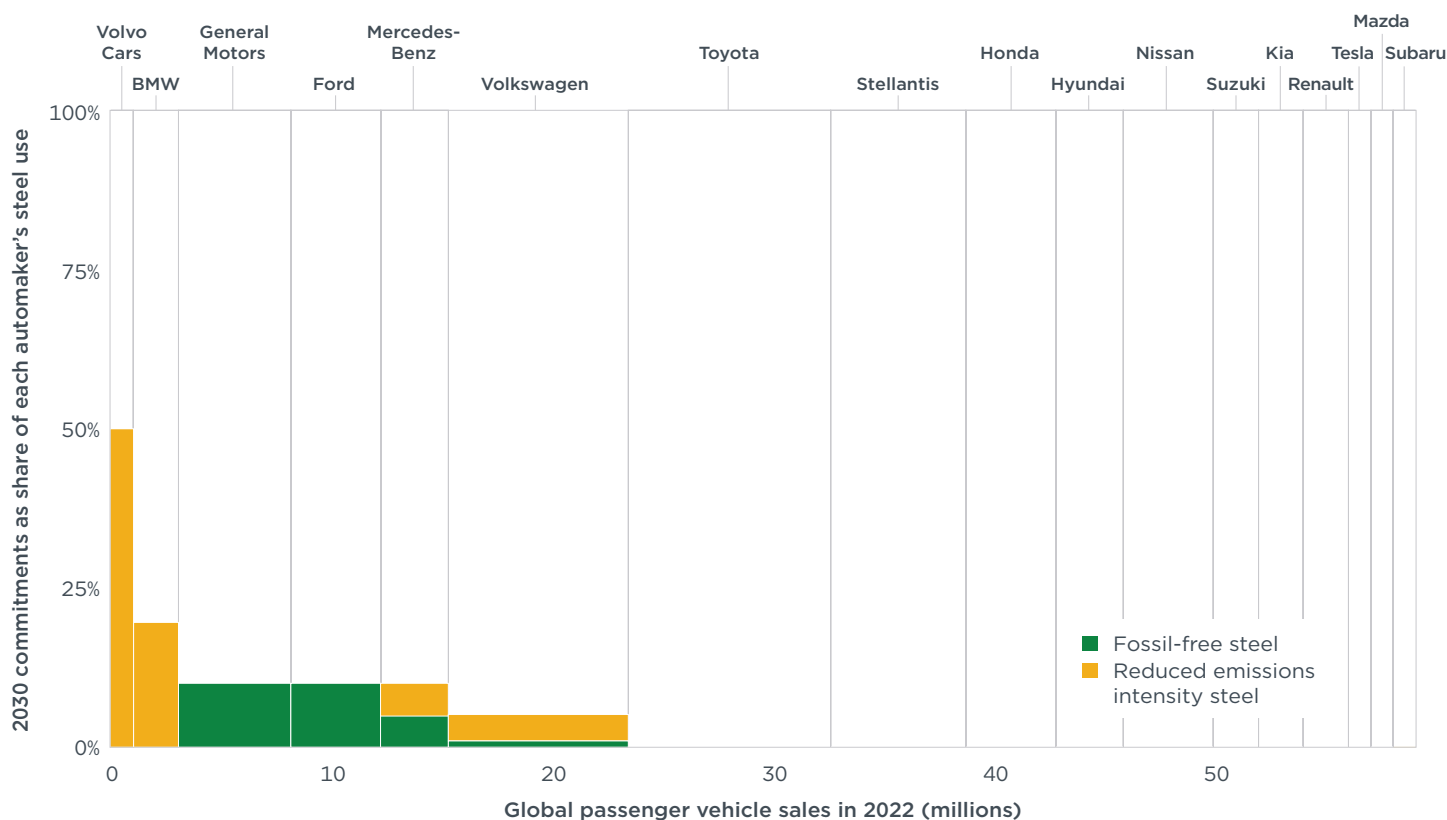
Switching to fossil-free steel will slash greenhouse gas emissions while adding **less than 1%** to a vehicle's purchase price.²

- 1 Ali Hasanbeigi, "Global Steel Industry's GHG Emissions," (blog) Global Efficiency Intelligence, April 7, 2022, <https://www.globalefficiencyintel.com/new-blog/2021/global-steel-industrys-ghg-emissions>; European Commission, Joint Research Centre, GHG Emissions of All World Countries—2023 (Publications Office of the European Union, 2023), <https://data.europa.eu/doi/10.2760/953322>.
- 2 Anh Bui et al., Technologies to reduce greenhouse gas emissions from automotive steel in the United States and the European Union (International Council on Clean Transportation, 2024), <https://theicct.org/publication/technologies-to-reduce-ghg-emissions-automotive-steel-us-eu-jul24/>.
- 3 International Energy Agency, Net zero by 2050: A Roadmap for the Global Energy Sector, 2021, <https://www.iea.org/reports/net-zero-by-2050>.

AUTOMAKERS' CURRENT COMMITMENTS TO PROCURE FOSSIL-FREE STEEL IN 2030 ONLY COVER 2% OF THEIR GLOBAL STEEL USE

Among major automakers selling vehicles in Europe and North America, only four have pledged to procure any fossil-free steel by 2030. The commitments total an estimated 2% of the global steel used by all these major automakers. Including commitments to procure steel with reduced GHG emissions increases the share of cleaner steel to 4% of all automotive steel.

Major automakers' commitments to procure cleaner steel



Note: Commitments up until 2030 are calculated as a share of total steel demand for each automaker without considering material utilization losses; only public commitments are included. The width of each section corresponds with global passenger vehicle sales.

FOSSIL-FREE STEEL CAN REDUCE GHG EMISSIONS BY MORE THAN 95%⁴

Using conventional blast furnace–basic oxygen furnace (BF-BOF) technology in Europe results in 1.4 tonnes of carbon dioxide equivalent (CO₂e) emitted to produce the steel needed for a typical internal combustion engine passenger car. The same process in the United States results in 1.9 tonnes of CO₂e per typical U.S. passenger vehicle. Producing automotive steel with a higher share of recycled content via an electric arc furnace (EAF)—and using the current average electricity mix—cuts the emissions to 0.8 tonnes of CO₂e per vehicle in Europe and 1.2 tonnes in the United States. This pathway will require increasing the supply of automotive-grade recycled steel to avoid diverting recycled steel from non-automotive applications.

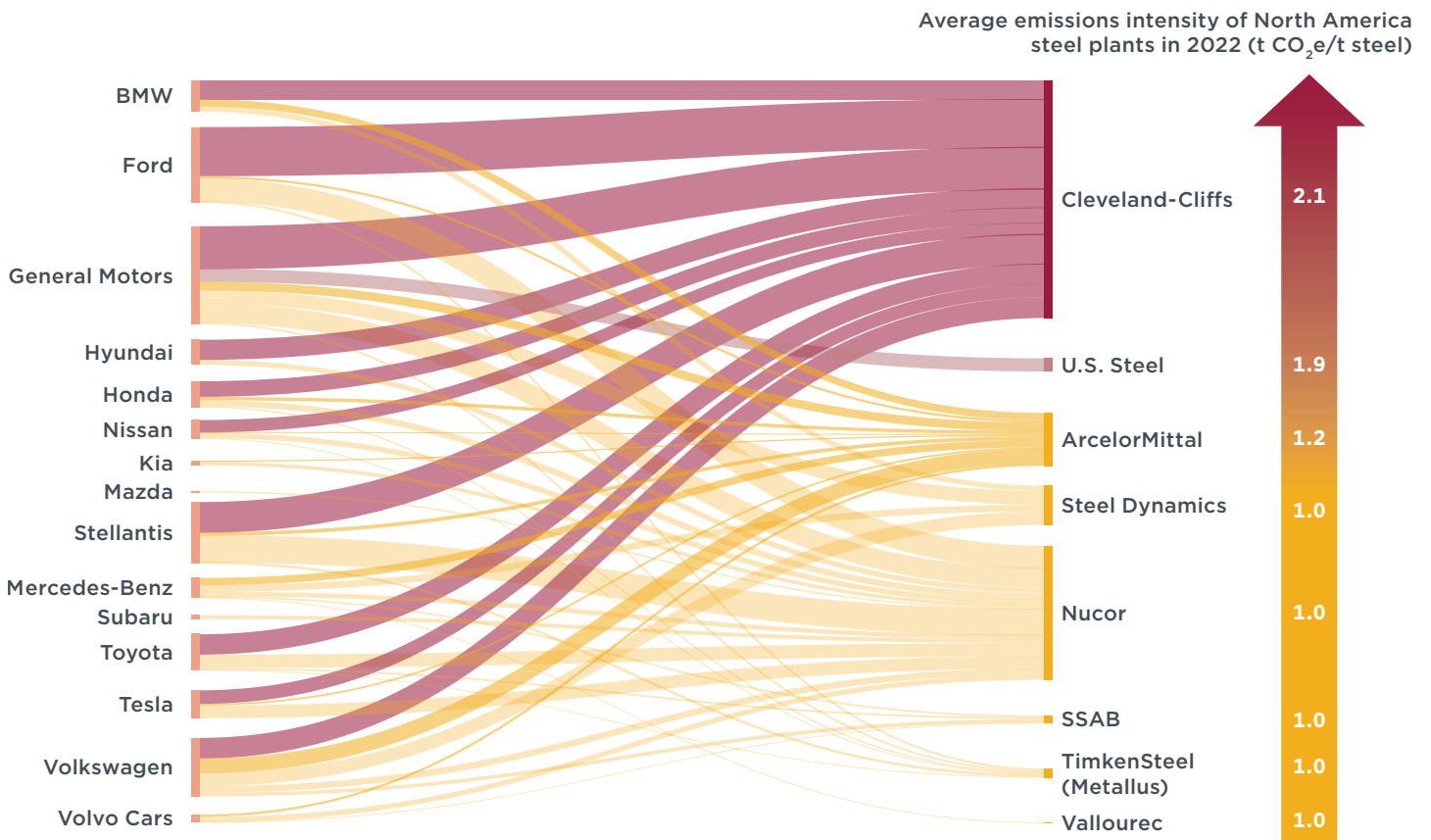
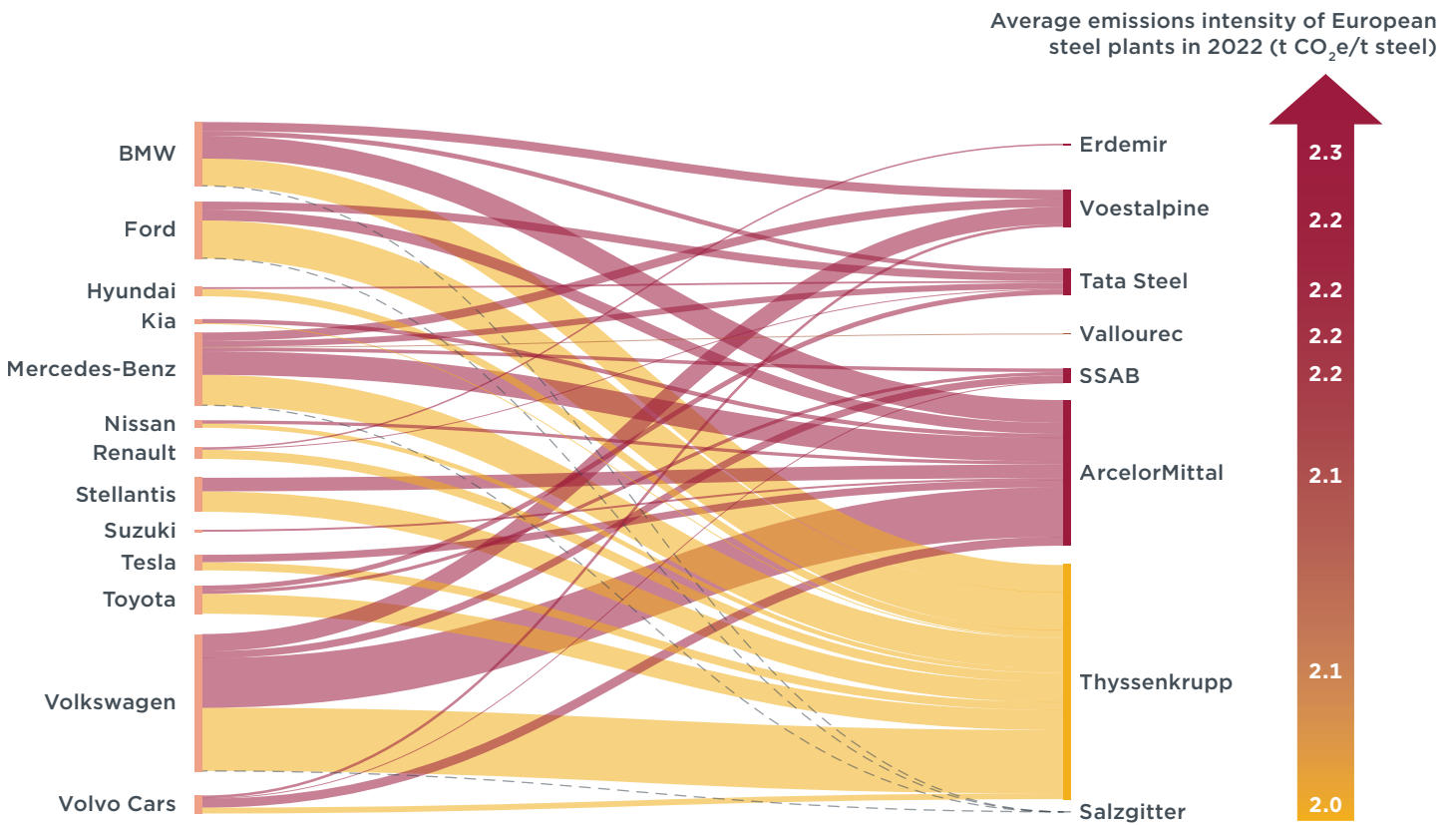
⁴ Anh Bui et al., *Technologies to Reduce Greenhouse Gas Emissions From Automotive Steel in the United States and the European Union* (International Council on Clean Transportation, 2024), <https://theicct.org/publication/technologies-to-reduce-ghg-emissions-automotive-steel-us-eu-jul24/>.

Making cars with fossil-free steel can reduce steel-related emissions to below 0.1 tonnes of CO₂e per typical vehicle both in Europe and in the United States. Technologies to produce fossil-free steel include using renewable energy and hydrogen to process iron ore, as well as using renewable electricity to recycle steel.

In Europe and North America, all automakers purchase from coal-reliant steel producers that have an average GHG emissions intensity of above 2 tonnes of CO₂e per tonne of steel

All of the steelmakers identified as supplying automakers in Europe produce a disproportionately high share of steel using the coal-based blast furnace–basic oxygen furnace process compared with the total steel market average. The steel from these producers therefore has a high average GHG emissions intensity of above 2 tonnes of CO₂e per tonne of steel. Several steelmakers in North America produce a higher share of recycled steel through electric arc furnaces, resulting in a wider range in emissions intensity of between 2.1 tonnes and 1.0 tonnes of CO₂e per tonne of steel. However, automakers mostly purchase steel with a lower-than-average share of recycled steel.

Economic connections between automakers and steel producers in Europe and North America



Note: The thickness of the flows is proportional to the economic value (in USD) exchanged between the companies in the respective regions. ICCT estimates are based on supply chain data for 2023 from Bloomberg L.P.

How can automakers and policymakers accelerate the shift to fossil-free steel?

Automakers could consider the following options to reduce steel-related GHG emissions of vehicle production:

- » **Demonstrate demand for fossil-free steel.** Commit to fossil-free steel procurement by signing pre-purchase agreements, directly investing in companies developing fossil-free steel capacities, or by joining industry initiatives such as SteelZero or the First Movers Coalition at the maximum level of ambition with specific timelines, steel quantities, and emissions reduction goals.
- » **Make vehicles easier to recycle.** Increase the availability of high-quality recycled steel by optimizing vehicle design for recyclability; this includes ways to reduce the contamination of steel with copper and other elements during the recycling process.
- » **Increase disclosure of steel emissions intensity and recycled content.** Require environmental product declarations from steel producers, track and disclose emissions intensity and quantities of pre- and post-consumer scrap in the purchased steel.
- » **Make vehicles lighter.** Increase lightweight designs to reduce the quantity of steel in a vehicle.

Policymakers could consider the following policy options to reduce the GHG emissions of steelmaking in general and steel used in vehicle production in particular:

- » **Provide subsidies to scale up fossil-free steel production.** Subsidies could help encourage further investment into clean technologies that for now entail higher costs.
- » **Introduce an emissions trading system covering the steel sector.** This market-driven approach can incentivize companies to reduce GHG emissions and invest in energy efficiency and decarbonization.
- » **Incentivize the use of fossil-free steel in vehicle production.** Some automakers have made commitments, but these are voluntary. Requiring a fossil-free steel quota or an average GHG emissions intensity threshold for steel used in new vehicles could boost demand and thereby promote investments by steel producers.
- » **Require vehicles to be designed for recycling and increase the supply of automotive-quality secondary steel.** Measures to increase the supply of high-quality secondary steel for automotive applications include ensuring the collection of end-of-life vehicles, improving the sorting of metal parts during vehicle dismantling and shredding, and requiring a recycled steel quota in newly built vehicles.

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