Steel Supply Chain Emissions Transparency: A Product-Level GHG Accounting Approach

Product-Level Data Enables Purchasers to Push for Emissions Reductions

Corporations and governments are signaling their intentions to purchase key commodities produced with lower emissions. Emissions data at the product level is key for informing purchasing decisions aligned with those goals. Further, it is critical to ensure that product-level emissions reporting is comparable based on primary data and to provide sufficient information for purchasing decisions to drive measurable emissions reductions.

Ore-Based and Scrap-Based Steel Differentiation Facilitates Decarbonization Decisions

Steel production requires product-level emissions reporting. A critical commodity for the functioning of modern society, steel contributes ~7% of global emissions (~2.6 Gt CO_2/year) from fuel combustion as well as a further 1.1 Gt CO_2/year in electricity-based emissions. Steel is produced from either **ore-based (primary)** or **scrap-based (secondary)** inputs. Production from scrap-based inputs is significantly less energy and emissions intensive than ore-based production due to material reductions included in the original manufacturing process.

	Ore-based steel	Scrap-based steel
Average energy intensity	**~21.4 GJ/t**	**~2.1 GJ/t**
Share of total steel emissions	**93%**	**7%**
Current share of steel production	**68%**	**32%**
Share of total steel production by 2050	**54%**	**46%**

Source: IEA

Approximately one-third of steel globally is currently scrap based. Increasing the market share of scrap-based steel is one lever the steel industry can use to decarbonize due to its lower energy and emissions intensity. However, scrap steel supply is limited and relies on existing steel infrastructure reaching end of life and being recycled. Models suggest recycled scrap will only meet half of overall steel demand by 2050. Accelerating the steel sector's decarbonization will therefore require technological improvements and associated emissions reductions in ore-based production (e.g., green hydrogen-based direct reduction).

Market Signals Demand for Decarbonization and Product-Level Emissions Accounting

The market has started to demand decarbonized ore-based production. Companies are piloting low-emissions ore-based steel technologies and planning commercial-scale projects. Banks have agreed on a framework that considers the scrap fraction in measuring steelmakers emissions performance. Responsible Steel has established thresholds for emissions performance based on the scrap fraction, and purchasers have started to demand low-emissions ore-based steelmaking through the Steel Zero platform.

Steelmakers Can Capitalize on this Momentum to Differentiate their Products

Gaining a competitive advantage to meet market demand for lower-emissions steel requires steelmakers to provide the emissions intensity of their ore-based and scrap-based supply chain segments (in addition to the overall emissions footprint and scrap content). This additional transparency would demonstrate their commitment to both: 1) incremental emissions reductions by increasing scrap-based share of materials and 2) transformational emissions reductions through manufacturing process changes in ore-based production.

Product-Level Reporting Supports Buyers to Make Informed Purchasing Choices

Product-level emissions reporting and scrap versus ore-based transparency would enable purchasers, investors, and other stakeholders to understand the key decarbonization levers they can collaboratively use to reduce steel sector climate impacts:

1. **Increasing scrap** – Steelmakers can demonstrate support for recycling by reporting on the recycled content of their products to the extent possible given global scrap supply.

2. **Deploying low-emissions ore processing technology** – Incorporating low-emissions technologies such as green hydrogen-based reduction will result in measurable emissions reductions. This will be reflected in the ore-based supply chain segment's emissions reporting, helping to differentiate sustainable steel manufacturers' products.

3. **Using zero-emissions electricity** – Incorporating renewables in manufacturing processes will further reduce scrap-based emissions due to the large and increasing portion of this material that is processed in electric-arc furnaces.

RMI's Steel Emissions Reporting Guidance Supports Steel Product-Level Reporting

RMI's new Steel Emissions Reporting Guidance provides the tools and methodologies to support steel supply chain actors in reporting product-level emissions based on the ore-based and scrap-based production processes. Using RMI's guidance, steelmakers can clearly demonstrate emissions reductions and purchasers can actively contribute to the decarbonization of this critical sector.

Please contact Lachlan Wright at lwright@rmi.org for more information about the new guidance.