A Matter of Ambition: Examining the Steel Industry's Commitment to Net Zero by 2050

Key points

- Only a third of the world's top 50 steel producers have set targets to reach net zero emissions by 2050, despite these 50 producers being responsible for more than 60% of the sector's emissions.
- Planned capacity for new coal-based blast furnaces is two-and-a-half times greater than planned new green iron and steel capacity. Green iron and steel projects are growing, but not fast enough to outpace emissions-intensive technologies.
- Only fourteen of the top 50 steel producers have defined the scope of emissions they plan to address through long-term decarbonization strategies, and six of the fourteen have not committed to specific target dates. Only two of the top 50 steel producers have included Scope 3 emissions in their net zero goals, demonstrating that top steel producers lack transparency around climate targets.

Summary

Steel decarbonization has become a hot topic in international and national policy summits over the past few years but remains an underutilized strategy to lower greenhouse gas (GHG) emissions. Bold action from steelmakers, including more aggressive emission reduction targets and a faster uptake of green steelmaking technologies, is needed to change the game.

The steel sector accounts for an estimated 7 to 9% of direct global greenhouse gas emissions , which makes it a critical sector, among several others, for reducing carbon dioxide emissions and limiting global temperature increase to no more than 1.5°C, in accordance with the Paris Agreement. The most effective way to achieve this reduction is by phasing out blast furnaces and other fossil fuel-dependent technologies between now and 2030.

Steel decarbonization is currently being tackled by government, civil society, and industry stakeholders through various policies and actions, including the Clean Energy Ministerial's Industrial Deep Decarbonisation Initiative (IDDI), SteelWatch's Sunsetting Coal in Steel campaign, the European Union's Carbon Border Adjustment Mechanism, the United States' Inflation Reduction Act, the ResponsibleSteel initiative, The Climate Group's SteelZero initiative, and the Steel Science Based Targets Initiative (SBTi) guidance, among others.

While government and financing support are key levers to drive the green steel transition, steel decarbonization requires action from stakeholders across the board, especially the companies that produce steel. The choices steel producers make about the types of technologies and processes they operate are clear indicators of whether the steel industry will reach net zero emissions by 2050. Global Energy Monitor's (GEM) Pedal to Metal 2023 highlights the contrast between current coal-based iron and steel production announcements and the expected actions needed to align with net zero emissions by 2050. Current development plans show that the global steel industry is not on track to meet net zero goals. Adding further concern, this brief shows that only a fraction of major steel-producing companies have committed to plans to reach net zero.

The industry will fall short of Paris Agreement climate goals without increased ambition

According to The World Steel Association, a total of 1,962 million tonnes of crude steel were produced worldwide in 2021, generating more than 2.7 gigatonnes (Gt) of CO2 in direct (Scope 1) emissions and 1.1 Gt CO2 in energy-related (Scope 2) emissions. Just 50 companies were responsible for nearly 60% of this steel, with each of these companies producing more than eight million tonnes of crude steel per annum (Mtpa). As such, this brief examines the GHG emission scopes (1, 2 and 3) that steel producers plan to monitor and reduce.[1]

According to GEM's Global Steel Plant Tracker, nearly 80% of the steelmaking capacity operated by the top 50 steel producers uses emissions-intensive coal-based blast furnace-basic oxygen furnace (BF-BOF) steelmaking, well-above the 67% of global steelmaking capacity that uses BF-BOF. This means that while these top companies produce nearly 60% of global crude steel, they are likely responsible for well-over 60% of the emissions from crude steel production.

Only half of the top 50 steel producers have set an emissions reduction goal for 2030 or shortly thereafter (Figure 1). 20 steel producers have set their emissions reduction goal to 2030. Five companies aim for a milestone after 2030 and before 2040 (producing 190 Mtpa). The remaining steel producers either have not stated their goal emission reduction for 2030 (ten companies producing 244 Mtpa) or have not provided any information on emission reduction goals (fifteen companies producing 215 Mtpa).

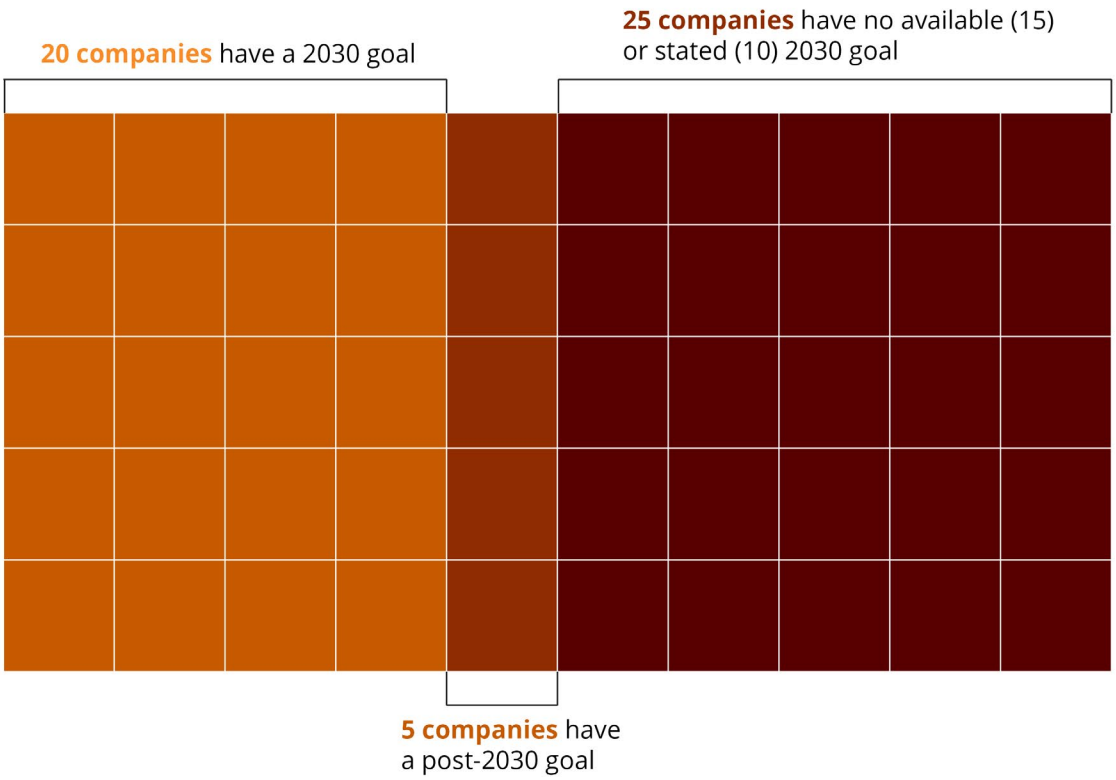
Despite the lack of 2030 goals, data from the Green Steel Tracker show that only a third of the top 50 steel-producing companies have reported a 2050 climate goal. According to the International Energy Agency (IEA) scenarios for net zero emissions, CO2 emissions from heavy industries need to drop 93% by 2050. Yet only 17 of the largest 50 steel producers have publicly committed to achieving carbon neutrality by mid-century.

Figure 2 illustrates the diversity in carbon neutrality goals of the top 50 steel producers, as of October 2023. One company plans to reach carbon neutrality before 2050, while sixteen companies aim to achieve it by 2050. Two additional companies have expressed their plan to achieve carbon neutrality after 2050. However, a significant portion of the top 50 steel producers either have not stated their 2050 target (sixteen companies generating 318 Mtpa) or have not provided any information regarding climate targets at all (fifteen companies generating 215 Mtpa).

1. For additional details on the collected data, please consult the Green Steel Tracker dataset.

Half of top steel producers lack 2030 emissions goal

Emissions reduction targets of the world's top 50 steel producers; each square represents one company



Steel production from top 50 producers grouped by their emissions reduction goal status, in million tonnes per annum (Mtpa)

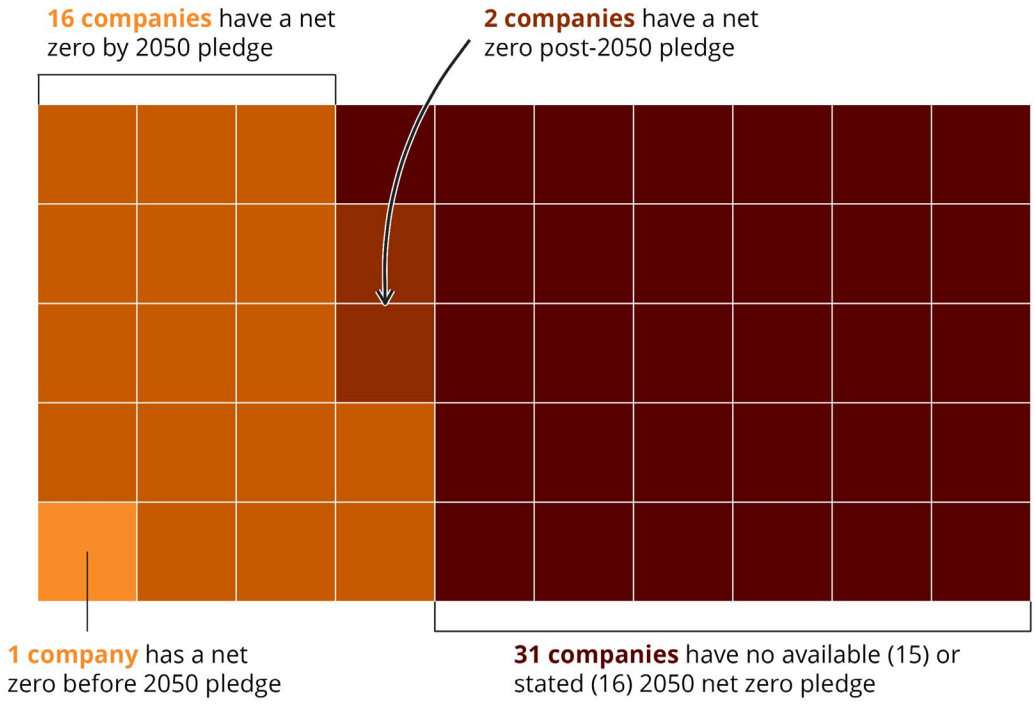
Note: Not available means no publicly-available information about the sustainability reporting of the company could be found, while not stated means the company has sustainability reporting but no emissions reduction targets to 2030 are mentioned.

Source: Green Steel Tracker

Figure 1

Only a third of top steel producers have pledged to reach net zero by 2050

Net zero by 2050 commitments of the world's top 50 steel producers; each square represents one company



Steel production from top 50 producers grouped by their net zero pledge status, in million tonnes per annum (Mtpa)

Note: Not available means no publicly-available information about the sustainability reporting of the company could be found, while not stated means the company has sustainability reporting but no net zero pledges to 2050 are mentioned.

Source: Green Steel Tracker

Leadit LEADERSHIP GROUP FOR INDUSTRY TRANSITION Global Energy Monitor

Figure 2

Fourteen of the top 50 steel companies have established targets with defined emission scopes

There are three emission scopes that help to measure and assess companies' progress in reducing their overall emissions and support reaching their climate goals. These are differentiated according to the type of emission, direct or indirect. **Scope 1** emissions include direct GHG emissions from the company's own furnaces, vehicles, and chemical processes. Emissions associated with the company's purchase of electricity are indirect **Scope 2** emissions. Other GHG emissions that come from the company's supply chain are part of **Scope 3** emissions.

Scope 3 emissions play a significant role in the steel sector, as they encompass GHG emissions from material extraction, preparation and processing, transportation, as well as fuel and energy-related emissions that are not covered under Scope 1 or 2 emissions but can make up well over 40% of overall emissions. Analysis from GEM showed that just the methane emissions from metallurgical coal mined for the iron and steel industry could increase the industry's reported carbon footprint by up to 27%.

According to LeadIT's mapping of GHG emissions scopes, only fourteen out of the top 50 steel producers have defined the emissions scope to reach their climate goals by 2050 (see Figure 3). The remaining companies either have not stated which emissions scopes they will measure (20 companies) or have no information publicly-available about their climate targets (16 companies).

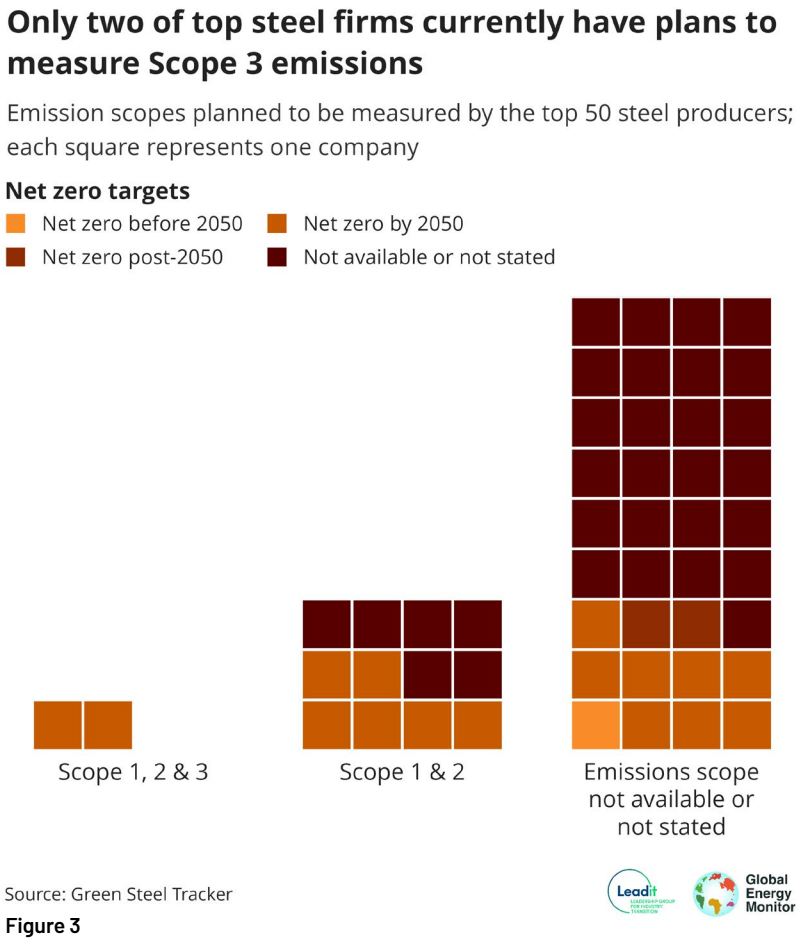


Figure 3

Technology options to transition iron and steel production

A central aspect of reducing carbon dioxide emissions from iron and steel production is the type of technology and fuel energy sources used. Steel production can take several different routes, depending on the choice of source material. The primary route relies on raw materials, namely iron ore, whereas the secondary route involves recycling steel scrap.

Primary steel has mainly been produced for several decades through a coal-intensive manner, using a Blast Furnace (BF) and a Blast Oxygen Furnace (BOF). Secondary steel production uses an Electric Arc Furnace (EAF) to remelt scrap metal, yielding less than half the CO2 emissions compared to primary steel production. EAFs can also be used with a Direct Reduced Iron (DRI) plant for primary steel production that does not use metallurgical coal and achieves steel production with 64% of the emissions of BF-BOF steel production. Thus, the need for a technological shift in primary steel production towards cleaner primary production and increased secondary production is an urgent one.

Carbon dioxide emissions in primary steel production could also be lowered through the adoption of technologies currently under development and commercial scaling, including Molten Oxide Electrolysis (MOE), DRI using non-fossil based fuels such as green hydrogen, using a submerged arc furnace (SAF) to process DRI for steel production in a BOF, advancements in electroslag remelting (ESR) technologies, and electrowinning, among others.

The iron and steel industry consumes 8% of global energy produced, meaning that shifting iron and steel production technologies to non-fossil energy sources will be a critical tactic for reducing global emissions.

Carbon Capture, Usage, and Storage

Carbon capture, usage, and storage (CCS/CCUS) technologies are frequently integrated into decarbonization models and pathways for heavy industry. While CCS/CCUS could play a critical role in reducing emissions from the iron and steel sector if it proves viable and scalable, CCS/CCUS application attempts to date have yet to succeed and CCS/CCUS alone cannot provide a comprehensive decarbonization solution to the industry. Thus, caution should be exercised to prevent it from encouraging steelmakers to invest more resources into carbon-intensive production equipment.

Planned iron and steel capacity

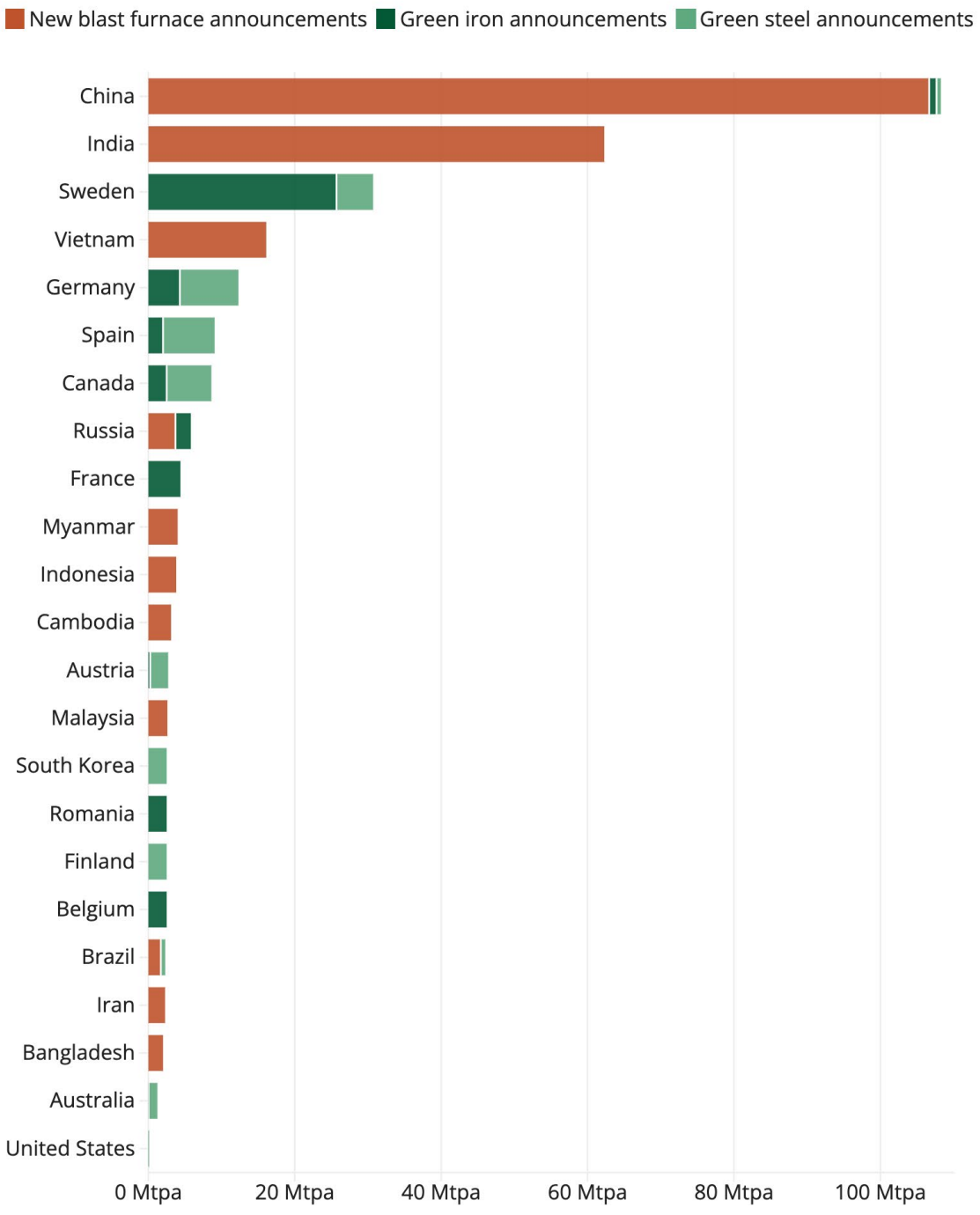
While plans to build low-emissions, green steel capacity have ramped up in recent years, announcements for new emissions-intensive blast furnaces still far outpace them. The capacity for newly-announced blast furnaces is 2.5 times larger than for low-emissions iron and steel. Globally, new announced blast furnace capacity totals 208.2 Mtpa, while low-emissions projects for primary steel production total only 83.6 Mtpa. An overview by country and project type of planned installed capacity is available in Figure 4.[2]

The outplay of the emissions-intensive planned new capacity challenges the ability of the steel sector to decarbonise. A new blast furnace that is serviced and refurbished could operate for up to 40 years. In practice, this means that a blast furnace starting operations in 2025 could potentially continue production until 2065. Since options to decarbonize blast furnaces are limited, steel producers could be at risk of perpetuating emissions-intensive steel production and preventing the green steel transition from progressing (i.e. a technology carbon lock-in).

2. Note that an additional 68.1 Mtpa blast furnace capacity is currently under construction.

New blast furnace announcements outweigh low-emission steel projects

Iron and steel announcement capacity by country, in million tonnes per annum (Mtpa)



Source: Global Blast Furnace Tracker, Green Steel Tracker
Data last updated summer 2023

Leadit Global Energy Monitor

Figure 4

Under current plans, most countries will either double down on emissions-intensive blast furnace plants (e.g. India, Vietnam, Myanmar, etc.), or focus on building out only low-emissions iron and steelmaking technologies (e.g.. Sweden, Germany, Spain, etc.). However, a few countries, namely China, Russia, and Brazil, are sending mixed messages about their transition plans for the steel industry.

Conclusion

Climate ambition and emission reduction goals that are not accompanied by a strategy to measure the emissions might fall short of plans to become carbon neutral. Steel producers should thus seek to describe both the timeline to 2030 and 2050 as well as the scale and emission scopes that are to be measured and ultimately reduced in order to achieve net zero emissions from steel production by 2050.

Earlier this year, the IEA explicitly declared the iron and steel sector "not on track" to reach net zero by 2050 given efforts to date. The findings presented in this briefing further show that ambition within the sector, especially from top steel producers, must be raised in order to reach carbon neutrality goals. At a minimum, steel-producing companies must set emissions targets and measure progress towards those targets.

Steel companies have had the means to set emissions targets and measure progress through various protocols and tools for decades, and new tools and resources make it easier than ever before.

Most recently, in September 2023, the Science Based Targets Initiative launched a sector-specific tool for setting Scope 1, 2 and 3 emissions targets for iron and steel producers. This tool provides clear and well-documented guidance for setting emission reduction targets that align with science-based decarbonization pathways. Lack of understanding, tools, and data are no longer viable reasons for a steel producer to not have committed to a net zero 2050 emissions target.

Once steel-producing companies have set their targets, achieving them will be made possible by economic and policy tools, including the transfer of technology and knowledge from developed economies to emerging economies, green steel procurement agreements (both public and private), and economic instruments like subsidies, financing, and tax incentives that help green steel producers compete with coal-based steel production.

Background on Global Energy Monitor

Global Energy Monitor (GEM) develops and shares information in support of the worldwide movement for clean energy. By studying the evolving international energy landscape and creating databases, reports, and interactive tools that enhance understanding, GEM seeks to build an open guide to the world's energy system. Users of GEM's data and reports include the International Energy Agency, United Nations Environment Programme, the World Bank, and the Bloomberg Global Coal Countdown. Follow us at www.globalenergymonitor.org and on Twitter/X @GlobalEnergyMon.

Background on LeadIT

LeadIT gathers countries and companies that are committed to action to achieve the Paris Agreement. It was launched by the governments of Sweden and India at the UN Climate Action Summit in September 2019 and is supported by the World Economic Forum. LeadIT members subscribe to the notion that energy-intensive industry can and must progress on low-carbon pathways, aiming to achieve net-zero carbon emissions by 2050. Follow LeadIT and the Green Steel Tracker at www.industrytransition.org

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