



Sustainability in the American Steel Industry

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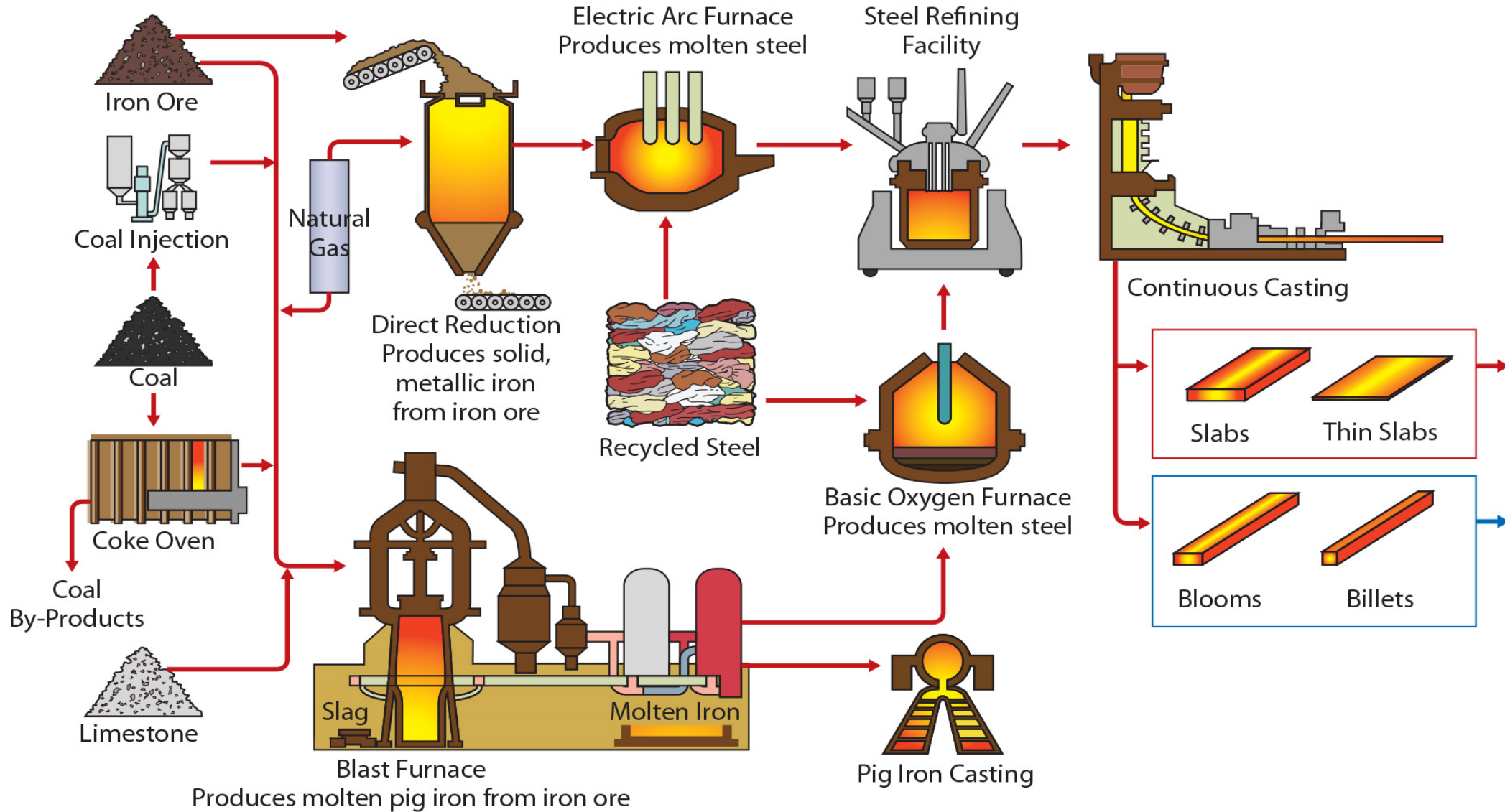
American Iron and Steel Institute

June 1, 2022



**American
Iron and Steel
Institute**

Two Steelmaking Processes



The Circular Life Cycle of Steel



Source: worldsteel

Overview: American Steel Industry



- Cleanest and most energy efficient of the major steel industries in the world
- Essential to the U.S. decarbonization strategy, national and economic security, and critical infrastructure
- Supports nearly two million American jobs



Social Media – Steel Messaging

AISI @aisisteel · Apr 14

The American steel industry is fundamental to the manufacturing sector and to the overall economy. [#steel](#) [#steelsustains](#) [#reduceuserecycle](#) [steel.org/sustainability/](https://www.steel.org/sustainability/)



A photograph of a steel utility pole structure against a blue sky. A white text box is overlaid on the right side of the image.

American Iron and Steel Institute

Steel utility poles are about 50% lighter than wood, reducing transportation costs and making them easier to handle on the job site.

#STEELSUSTAINS
[steel.org/sustainability](https://www.steel.org/sustainability/)

American Iron and Steel Institute

April 11 at 10:26 AM · 🌐

Steel is the material of choice to support a clean energy future. Learn more: <https://www.steel.org/sustainability/> [#steelsustains](#) [#reduceuserecycle](#)



A hand holding a silver metal food can against a yellow background. Text is overlaid on the right side.

Recycling one steel food can conserves enough energy to light a 10-WATT LED BULB for over 24 HOURS.


#STEELSUSTAINS
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Steel is the most environmentally effective choice and a key component to powering today's vehicles. <https://lnkd.in/etXDWgWR> [#steel](#) [#steelsustains](#) [#reduceuserecycle](#)



A photograph of a car assembly line with robotic arms. A white text box is overlaid on the left side.

American Iron and Steel Institute

Steel is continuously recyclable and enables manufacturers to make lighter, more fuel-efficient vehicles.

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Message Highlights

- American steel production is the cleanest of the major steel-producing countries
- “It Starts with Steel”
- Steel is vital to most sustainable energy technologies



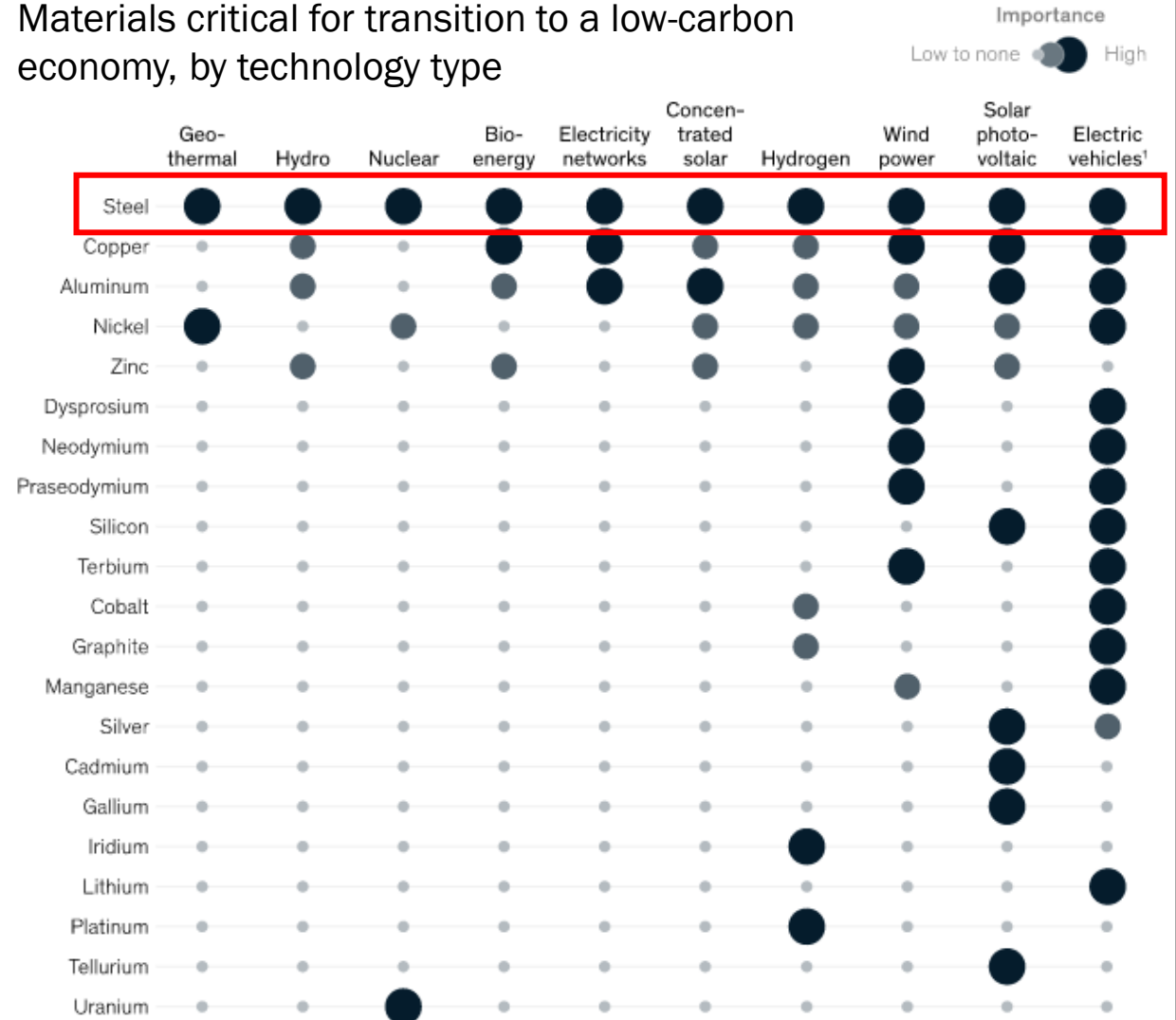
Steel is Vital to Sustainable Energy Technologies

The raw-materials challenge: How the metals and mining sector will be at the core of enabling the energy transition

January 10, 2022 | Article

- McKinsey & Company: “The transition to a net-zero economy will be metal-intensive.”
- Steel is the only material critical to all low-carbon technologies

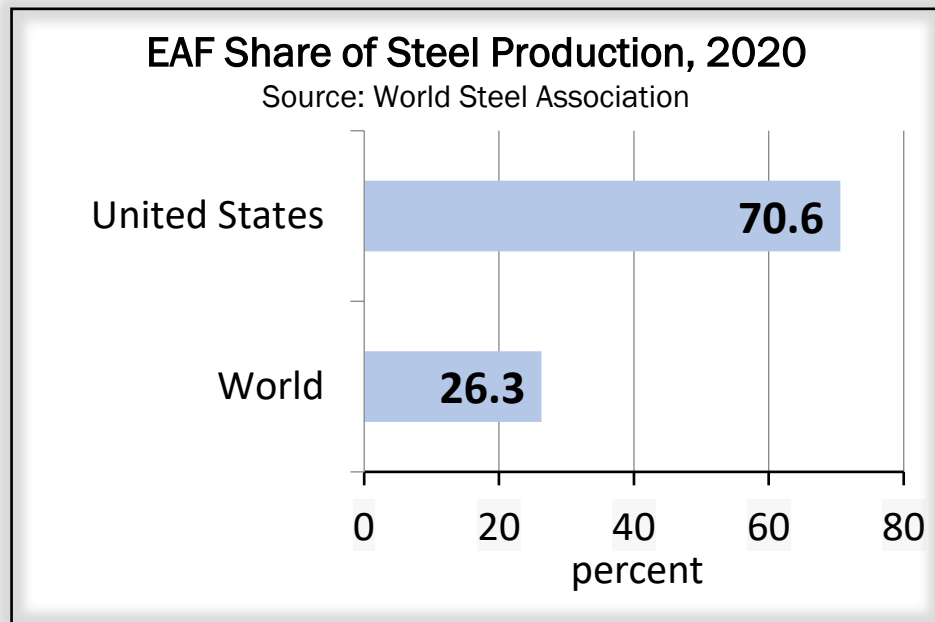
Materials critical for transition to a low-carbon economy, by technology type



¹Includes energy storage.

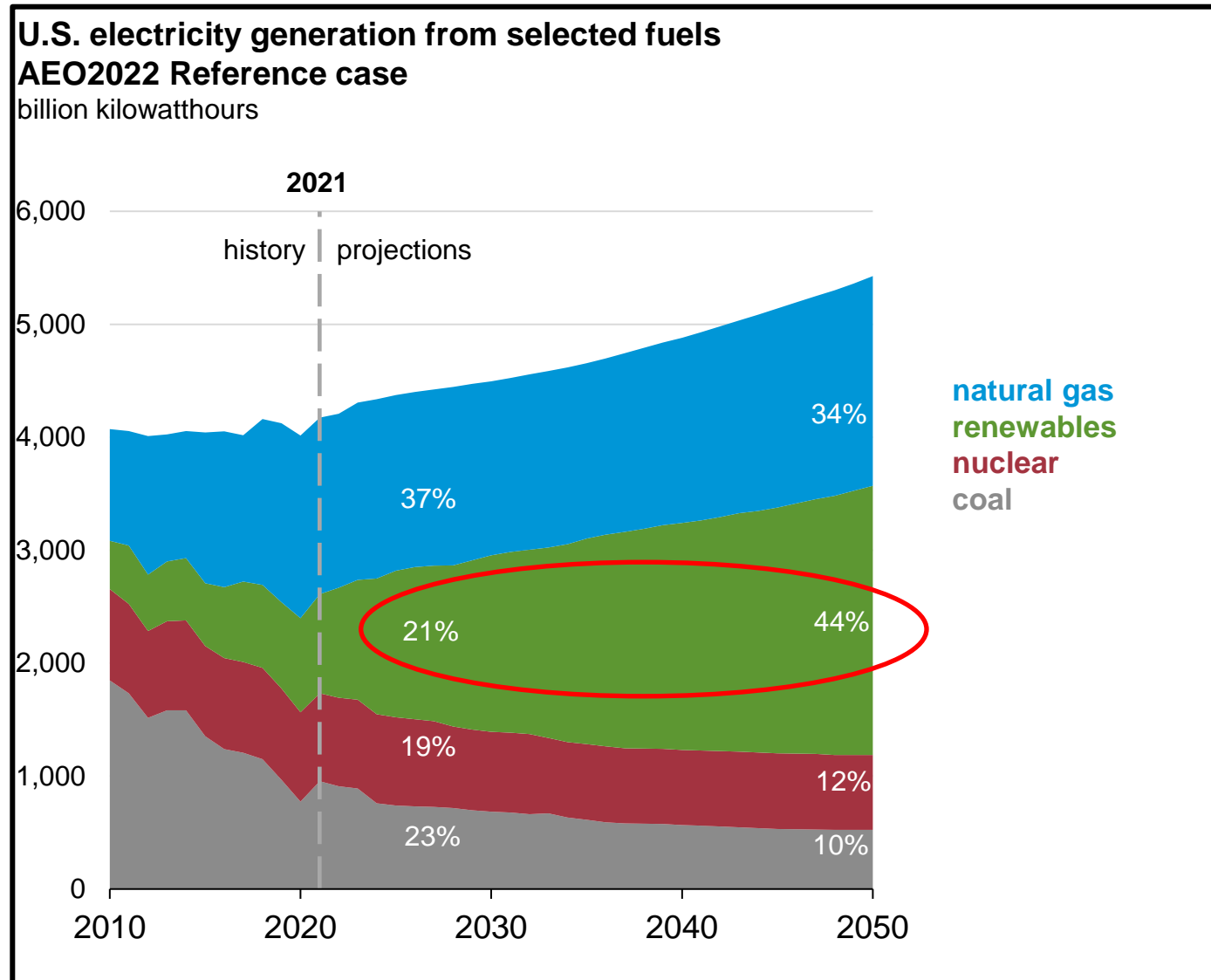
Source: Critical raw materials for strategic technologies and sectors in the EU, A foresight study, European Commission, Mar 9, 2020; The role of critical minerals in clean energy transitions, IEA, May 2021; McKinsey analysis

What Makes American Steel Sustainable?



- Integrated mills primarily use pelletized iron, not the lower quality sintered iron used in China and elsewhere
- Significantly greater use of natural gas vs. coal as an energy source
- Larger share of electric arc furnace (EAF) production than other regions
- 60 to 80 million tons of steel scrap is recycled each year into new steel products in the U.S.
- Cleaner electricity grid

U.S. Electricity Generation from Renewable Sources



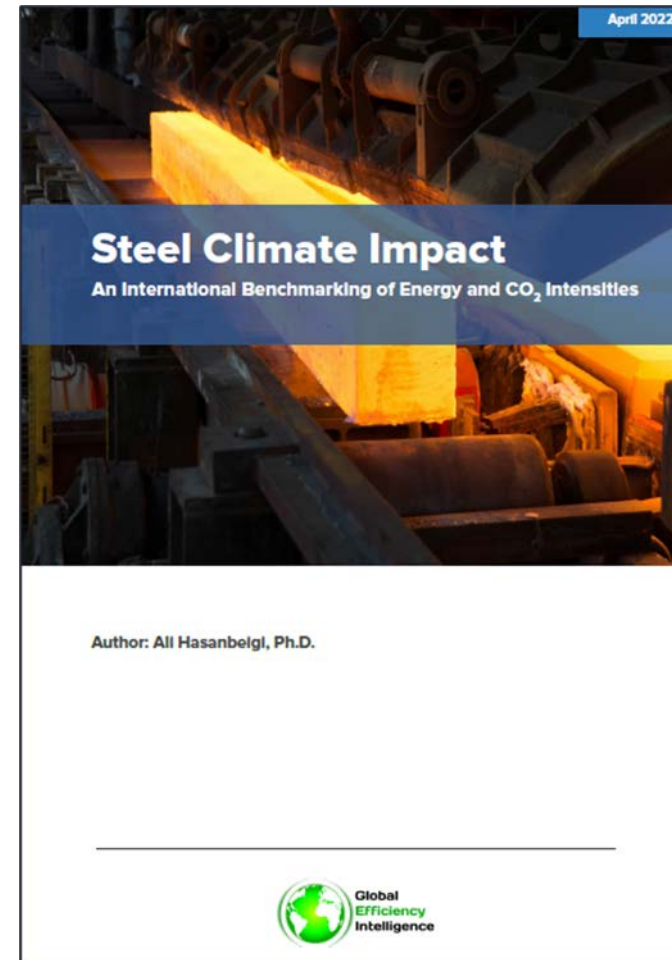
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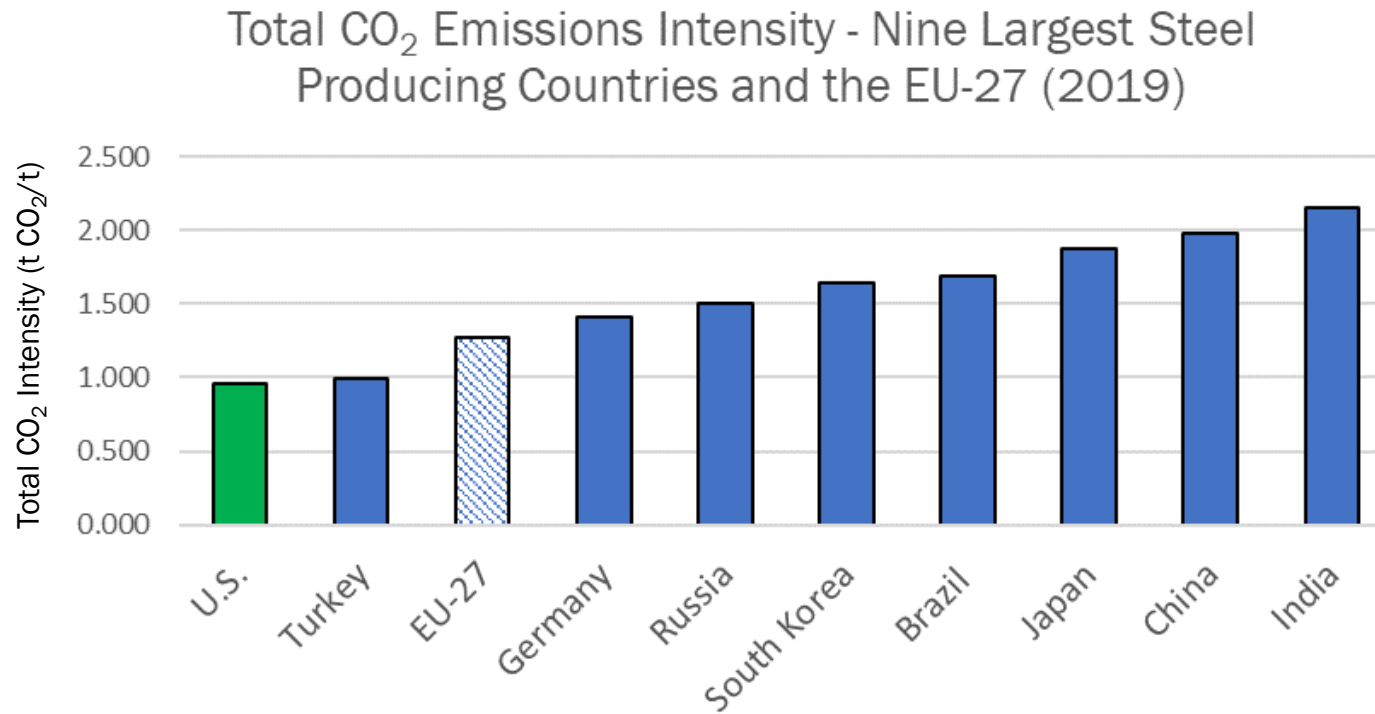
Independent Statistics & Analysis
U.S. Energy Information
Administration

CO₂ Emissions Intensity Benchmarking Report

- New report released April 2022 by Global Efficiency Intelligence (Dr. Ali Hasanbeigi)
- Calculates CO₂ emissions intensity of the steel industry in various regions and countries
- Report is based on 2019 data
- Continues to support the message that American steel is the cleanest of the major steel producing countries

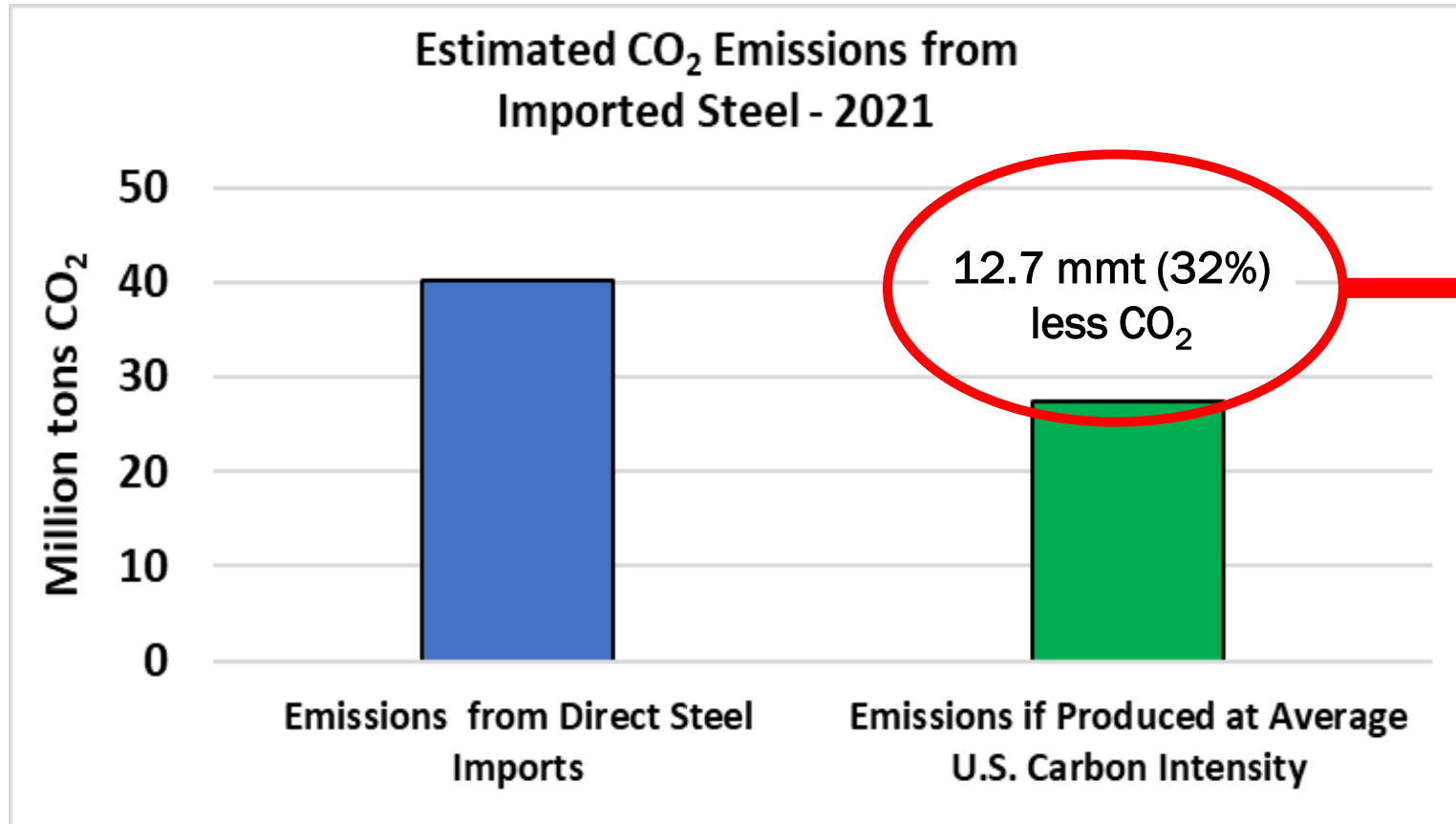


CO₂ Emissions Intensity Benchmarking Report



Adapted from: Hasanbeigi, "Steel Climate Impact: An International Benchmarking of Energy and CO₂ Intensities," Global Efficiency Intelligence, 2022.

Accounting for Emissions in Imported Steel



Equivalent to the CO₂ emissions from:

- 2.7 million passenger vehicles driven for one year
- 1.6 million homes' energy use for one year

Sources: AISI analysis of data from U.S. Census Bureau and Hasanbeigi, "Steel Climate Impact: An International Benchmarking of Energy and CO₂ Intensities," Global Efficiency Intelligence, 2022; EPA GHG Equivalencies Calculator, <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

Continuing Efforts To Enhance Sustainability

- Work is also underway on projects to further enhance the sustainability of domestic steelmaking:
 - Advancements in the use of Direct Reduced Iron (DRI) and Hot Briquetted Iron (HBI) in place of coal-based pig iron in both integrated and EAF steelmaking
 - Using renewable energy-based hydrogen as a reduction agent in DRI/HBI production
 - Carbon capture and storage/use
 - Increased use of renewable energy in steel industry facilities



What is Driving This? - Buy Clean Initiatives

- Buy Clean California Act, October 2017, established embodied GHG emissions thresholds for select materials used in public buildings
- Buy Clean Colorado Act, July 2021, requires EPDs beginning July 2022
- Other states considering Buy Clean legislation include Washington, Oregon, Texas, Minnesota, New York, and New Jersey
- At the federal level, a Buy Clean Task Force is working toward the goal of a comprehensive federal Buy Clean program
 - Timing unclear at this point

What is Driving This? - Engineers and Architects

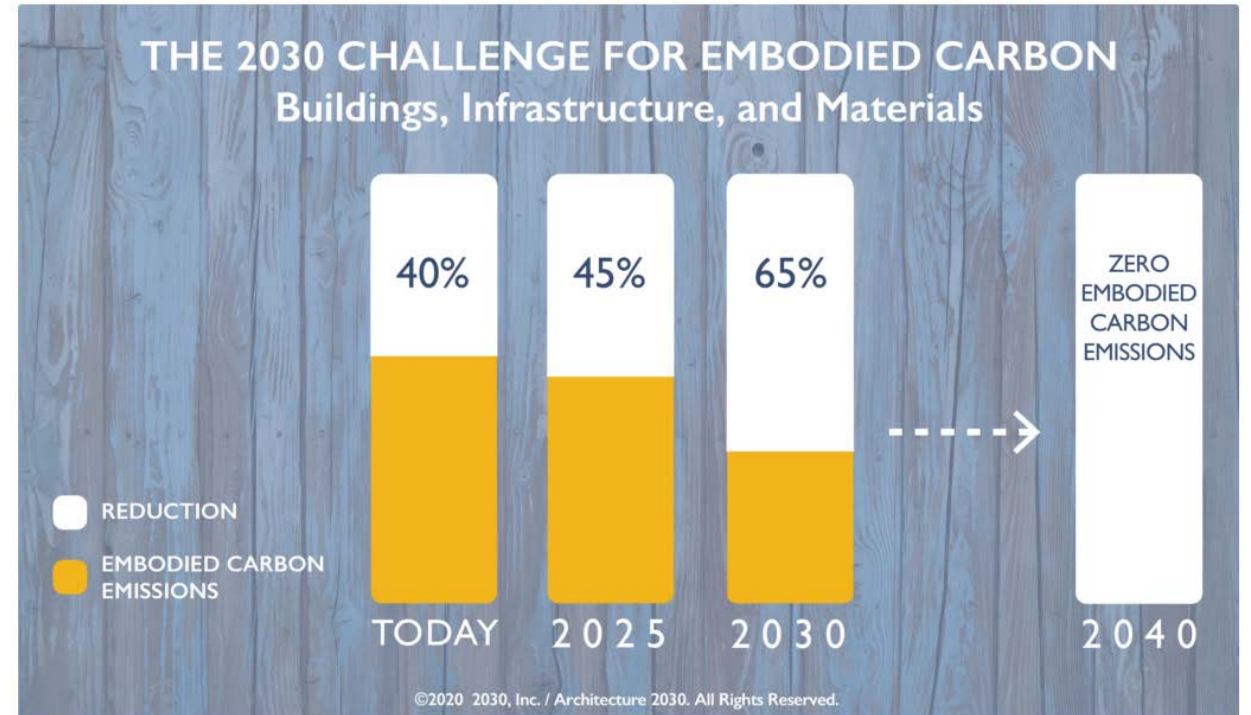


AIA **2030** Commitment

Making a Difference Now, For the Future

COMMITTING TO NET ZERO

The mission of the SE 2050 Commitment is to support the SE 2050 Challenge and transform the practice of structural engineering in a way that is holistic, firm-wide, project based, and data-driven. By prioritizing reduction of embodied carbon, through the use of less and/or less impactful structural materials, participating firms can more easily work toward net zero embodied carbon structural systems by 2050.



What is an EPD?

- “An EPD communicates verifiable, accurate, non-misleading environmental information for products and their applications” (www.sphera.com)
- “An Environmental Product Declaration, or EPD, is a document which transparently communicates the environmental performance or impact of any product or material over its lifetime” (www.oneclicklca.com)
- Intended to be a mechanism for simple presentation of results of an LCA on a material, product or system
- EPDs may be industry-wide or facility-specific

What is an EPD?

NUTRITION FACTS

Serving Size 2oz (57g)
Servings Per Container 6

Amount Per Serving

Calories 200 Calories from Fat 15

	% Daily Value*
Total Fat 1.5g	2%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	
Sodium 0mg	0%
Potassium 260mg	7%
Total Carbohydrate 35g	12%
Dietary Fiber 4g	16%
Sugars 1g	
Protein 9g	18%
Vitamin A 0%	• Vitamin C 0%
Calcium 2%	• Iron 10%
Thiamin 20%	• Riboflavin 10%
Niacin 15%	• Vitamin B6 10%
Phosphorus 25%	• Magnesium 15%
Zinc 20%	• Manganese 80%

*Percent Daily Values (DV) are based on a 2,000 calorie diet.

Environmental Product Declaration (EPD) for Concrete

Life Cycle Impact Results
(per m³)
Declared Unit: 1 m³ of 55 Mpa concrete at 28 days

OPERATIONAL IMPACTS	Cruz Azul CS50282022C1AR
Non-renewable primary energy (MJ)	3,010
Renewable primary energy (MJ)	15
Total primary energy (MJ)	3,026
Concrete batch water (m³)	0.11
Concrete wash water (m³)	0.07
Total consumptive water (m³)	0.18
Non-renewable material resource (kg)	2,832
Renewable material resource (kg)	0.001
On-site waste disposal hazardous (kg)	0.0
On-site waste disposal non-hazardous (kg)	3.7
ENVIRONMENTAL IMPACTS	
Climate Change (kg CO₂ eq)	673.0
Ozone Depletion (kg CFC 11 eq)	2.4E-06
Acidification Air (kg SO₂ eq)	3.4
Smog Potential (kg NOₓ eq)	0.08
Photochemical Ozone Creation (kg O₃ eq)	43.3

TRACI 2.1 Characterization Factors

Source: USGBC

What is an EPD?

ENVIRONMENTAL PRODUCT DECLARATION FABRICATED STEEL PLATE

AMERICAN INSTITUTE OF STEEL CONSTRUCTION



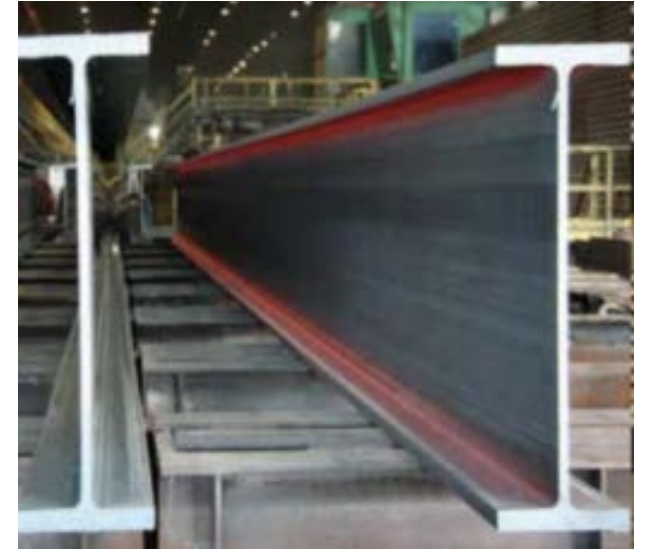
The United States structural steel industry annually supplies, fabricates and erects structural steel framing for more than 10,000 buildings, bridges and industrial projects through a network of producers, service centers, steel fabricators and erectors.

The National Steel Bridge Alliance, a division of the American Institute of Steel Construction (AISC), is a national, not-for-profit organization dedicated to advancing steel bridge design and construction. NSBA is a unified industry organization of businesses and agencies interested in the development, construction and promotion of cost-effective steel bridges. We represent the entire steel bridge community.

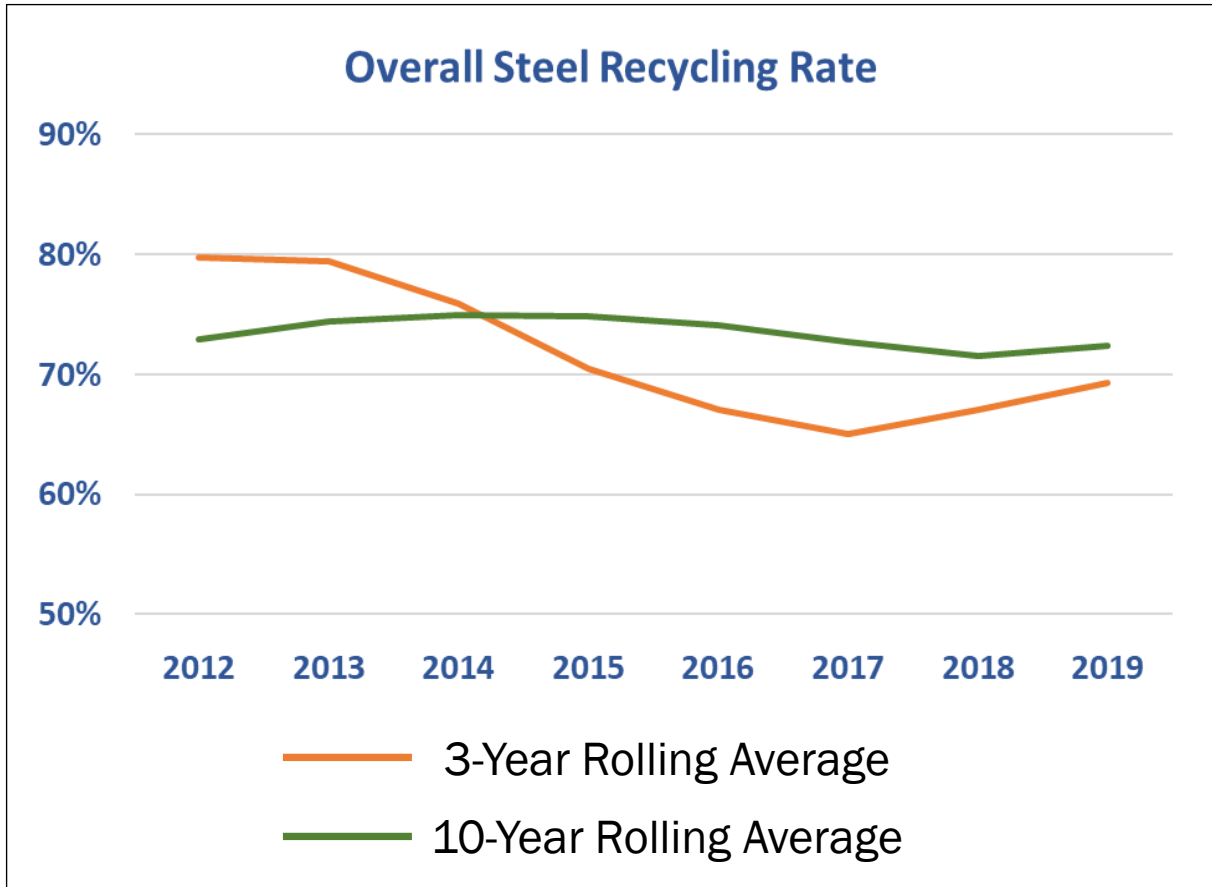
Long committed to the principles of sustainable manufacturing, the industry remains the world leader in the use of recycled materials and end-of-life recycling, with the recycled content of steel plate produced at US mills averaging in excess of 80% and an end-of-life recovery rate of 98%.

Steel Recycling

- Steel can be recycled across multiple applications
 - Steel is the most recycled material on the planet
 - A steel beam can become another steel beam, or a refrigerator, car door, or roof panel
 - 60 to 80 million tons of steel scrap are recycled annually in the U.S., with over 1 billion tons recycled in the last 30 years
 - Some steel construction products, such as structural sections and rebar, are typically produced from over 90% recycled steel



Steel Recycling Rates



The overall 3-year average recycling rate for 2019 was 69%, while the 10-year rate has been 71%-75% since 2011.

Steel Recycling Rates

Sector Recycling Rates (2019):

Construction, structural sections	97%
Construction, rebar	59%
Construction, other	68%
*Construction, general	74%
Automotive	96%
Appliances	78%
Containers	62%
Misc./Other	46%

*This category is a weighted average of the previous three construction sector categories.

Summary

- The American steel industry leads the world in terms of low carbon emissions intensity steel production
- The American steel industry continues to reduce its greenhouse gas intensity in response to numerous drivers
- Design and construction of bridges will undoubtedly be affected by sustainability initiatives in the near future
- “Embodied GHG emissions intensity” is the likely basis for any sustainability requirements
- EPDs for steel bridge components (“industry average” or “facility-specific”) will eventually be needed to demonstrate compliance

Life Cycle Inventory (LCI) Data Collection Project



- Important data for any EPD study that includes steel. Products included:
 - Hot rolled coil (HRC)
 - Cold rolled coil (CRC)
 - Hot-dip galvanized coil (HDG)
 - Plate
 - Structural sections
- New data now being collected
 - Based on 2021 data year
 - Results expected early 2023

Documents Available at www.steel.org



SUSTAINABILITY IN STEELMAKING



Steel is the EnviroMetal™. Producing a ton of steel today in North America requires less than half the energy that was needed to produce a ton of steel 40 years ago, resulting in a 50 percent reduction in greenhouse gas (GHG) emissions. This means that a single ton of steel produced today, compared to 1980, would save the GHG emissions equivalent to driving a car for 2,000 miles. The American steel



STEEL SUSTAINABILITY IN THE CONSTRUCTION MARKET

The National Institute of Standards and Technology notes that "steel has become one of the most reliable, most used and most important materials of the age." As an advanced engineered material, steel is the material of choice by engineers and architects because of its strong performance characteristics, durability, reliability, versatility in design and consistency as a product.



SUSTAINABILITY IN STEEL RECYCLING



Steel is 100 percent recyclable, which means it can be recycled into the same material of the same quality again and again. A steel beam can become another steel beam, or a refrigerator, car door or roof panel. When you buy steel you are buying recycled. In addition to being continually recyclable, steel's durable characteristics enable many common products to be reused.



STEEL SUSTAINABILITY IN THE AUTO MARKET



The North American steel industry continues to work to develop revolutionary new, advanced steel products for the automotive sector. Advanced high strength steels (AHSS) help auto manufacturers to reduce the mass of vehicles while maintaining safety standards — thereby increasing fuel economy and reducing tailpipe emissions. The use of current grades of AHSS can reduce a vehicle's structural

Light. Strong. Sustainable.
Steel is everything you need it to be.

Thank You / For More Information

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