

INTRODUCTION

The History of Steel

Since 1901, U. S. Steel has grown with America. Working through times of prosperity or challenge, we have produced the steel that built this nation. We are energized by the opportunity to create a better tomorrow for people and the planet.

1800s–1920s

1873–1875: Andrew Carnegie, through the firm Carnegie, McCandless & Co., built the Edgar Thomson Plant.¹

1875–1920: American steel production grew from 380,000 tons to 60 million tons annually, making the United States the world leader.²

1890: The Duquesne Steel Company Plant was sold to Carnegie Steel Corporation.³

1901: U. S. Steel was formed with the joining of American business icons Andrew Carnegie, J.P. Morgan and Charles Schwab, led by Elbert H. Gary, U. S. Steel's first chairman.⁴

1930s

The Great Depression reduced the country's total steel production by 75%, and steelworkers took wage cuts.⁵

1931: U. S. Steel moved its headquarters to New York City's Empire State Building when construction (using our steel) was completed.⁶

1936: Oakland Bay Bridge in San Francisco, CA,⁷ and the Henry Hudson Bridge in NY⁸ built using U. S. Steel's steel.

1938: The Ferrostal process (U. S. Steel trade name) was invented — the first for continuous tinplating.⁹

1940s–1950s

Steel formerly used for tanks and warships meets consumer demand for automobiles and home appliances. As more people moved to cities, buildings became larger and taller, and huge quantities of steel were required for girders and reinforced concrete.¹⁰

Basic oxygen steelmaking and electric arc furnaces make production processes faster and more energy efficient, allowing manufacturers to reuse scrap as input material.¹¹

1952: United Nations Headquarters Building,¹² Chesapeake Bay Bridge & Tunnel,¹³ and Three Sisters Bridges,¹⁴ and **1955:** Tappan Zee Bridge¹⁵ in NY—all built with U. S. Steel's steel.

1960s

Steel formerly used for scrap from vehicles, household appliances and industrial waste became a significant, and cheap, resource. In a basic oxygen furnace, up to 30% of the charge can be scrap steel.¹⁶

Structures built using our steel: **1964:** Verrazzano–Narrows Bridge;¹⁷ **1966:** The Vehicle Assembly Building (VAB).¹⁸

1970s

U. S. Steel researchers developed a one-side-electrogalvanizing process (known as the CAROSEL process), which applies a zinc coating to one side of steel sheet without affecting the mechanical properties of the steel. This steel is used for automobile panels and has provided good corrosion resistance while maintaining the excellent paintability and appearance of cold rolled steel.¹⁹

1970: The U. S. Steel Tower, the tallest skyscraper in Pittsburgh, Pennsylvania, is built with our COR-TEN® Steel.²⁰

1971: U. S. Steel built Disney's Contemporary Resort and the Disney's Polynesian Resort at Walt Disney World, in part to showcase its residential steel building “modular” products to high-end and luxury consumers.²¹

1970: John Hancock Center²² **1973:** Willis Tower²³ **1975:** New Orleans Superdome²⁴ **1977:** New River Gorge Bridge²⁵—all built with U. S. Steel's steel.

1980s

1974–1986: The U.S. steel industry was mired in a deep depression due to a ten-year economic downturn sparked by the OPEC oil embargo and the Iranian revolution.²⁶

1982: U. S. Steel acquired Marathon Oil Company²⁷ and, in early 1986, Texas Oil & Gas Corp.²⁸

1986: U. S. Steel Corporation changed its name to USX Corporation, with principal operating units involved in energy, steel and diversified businesses.²⁹

2000s

2000–2011: The United States government applied restrictions on steel imports from other countries to try to save the steel industry, but 5.4 million jobs were lost, and over 60,000 steel businesses closed. The big job of building the World Trade Center in New York City saved many jobs that would have otherwise been lost.³⁰

2000s: U. S. Steel acquired new steelmaking capacities.³¹

2000: U. S. Steel purchased the Slovak steelmaking assets of VSZ a.s., creating U. S. Steel Košice.³²

2002: USX Corporation is reorganized, which results in the spinoff of the steel and steel-related businesses of USX into a freestanding, publicly traded company known as United States Steel Corporation. The remaining energy businesses of USX became Marathon Oil Corp.³³

2003: U. S. Steel acquired the assets of the former National Steel Corp., adding iron ore reserves and significant integrated steelmaking capacity. The deal moved U. S. Steel from the 11th largest steel producer in the world to the fifth at that time.³⁴

2007: U. S. Steel acquired Lone Star Technologies, a leading producer of welded pipe for the oil and gas industry, bolstering our position in the growing energy sector and elevating U. S. Steel to North America's largest manufacturer of tubular steel products.³⁵

2010s

Continuous casting, along with innovations in rolling and finishing, have brought major efficiency gains while reducing the industry's demands on energy for heat and water for cooling.³⁶

2010–2018: Global crude steel production grows from 1,540 million metric tons to 1,875 million metric tons.³⁷

2019: Best of Both® strategy launched to combine the best of integrated and mini mill steelmaking technologies.³⁸

2020s

U. S. Steel acquired Big River Steel to further our strategy to create a more secure, sustainable future for the Company and our stakeholders. Big River Steel operates the most advanced state-of-the-art sustainable mill in North America.

We have led the industry by servicing diversified customers, including the automotive, construction, energy, appliance and packaging industries while pursuing lower-cost and lower-carbon-emitting strategies.

Endnotes of historical sources can be found on [page 137](#).

INTRODUCTION

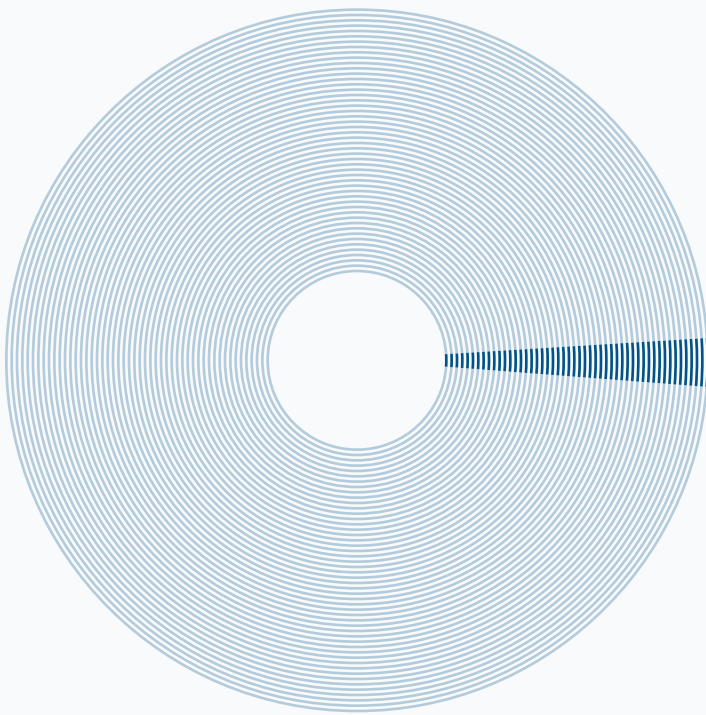
The Future of Steel

Steel is the most widely used metal. New steel products made from EAFs* contain up to 90% recycled steel, and those made from BOFs** contain up to 30% recycled steel, and all are infinitely recyclable.

~630 million net tons of steel are recycled annually, making it the world’s most recycled material.***

Different types of steel serve different functions:

- + Advanced High-Strength Steels (AHSS) provide an optimized blend of high strength and high formability to build stronger and lighter vehicles and machinery.
- + Non-grain-oriented electrical steels have electrical properties optimized for motors, including those for electric vehicles.
- + Grain-oriented electrical steels are primarily used in electric transformers.



2%
of steel industry raw materials end up as waste.

The steel industry’s co-products are also nearly entirely reusable, including in construction, road materials, heat generation and chemical manufacturing.

See diagram on [page 46](#)

Steelmaking has undergone huge advances:

It now consumes

40%

of the energy per pound it did in the 1960s. Our operations are leveraging computers and advanced process modeling, including predictive analytics and artificial intelligence.

Our mini mill, which can produce nearly all the products in our portfolio, can manufacture steel using up to

90%

recycled steel, versus no more than 30% in more integrated steelmaking processes.



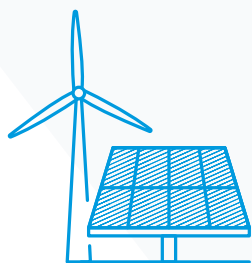
AUTOMOTIVE

Specialized steel is required for making electric-vehicle motors, and recycled steel is instrumental in the construction of new vehicles.



FOOD PACKAGING

U. S. Steel is the largest producer of tin-plated steel in the U.S., used for recyclable food-product cans.



RENEWABLES

Steel is a major component of solar power installations, wind turbines and transformers for electrification — all helping companies to reach net-zero emissions.

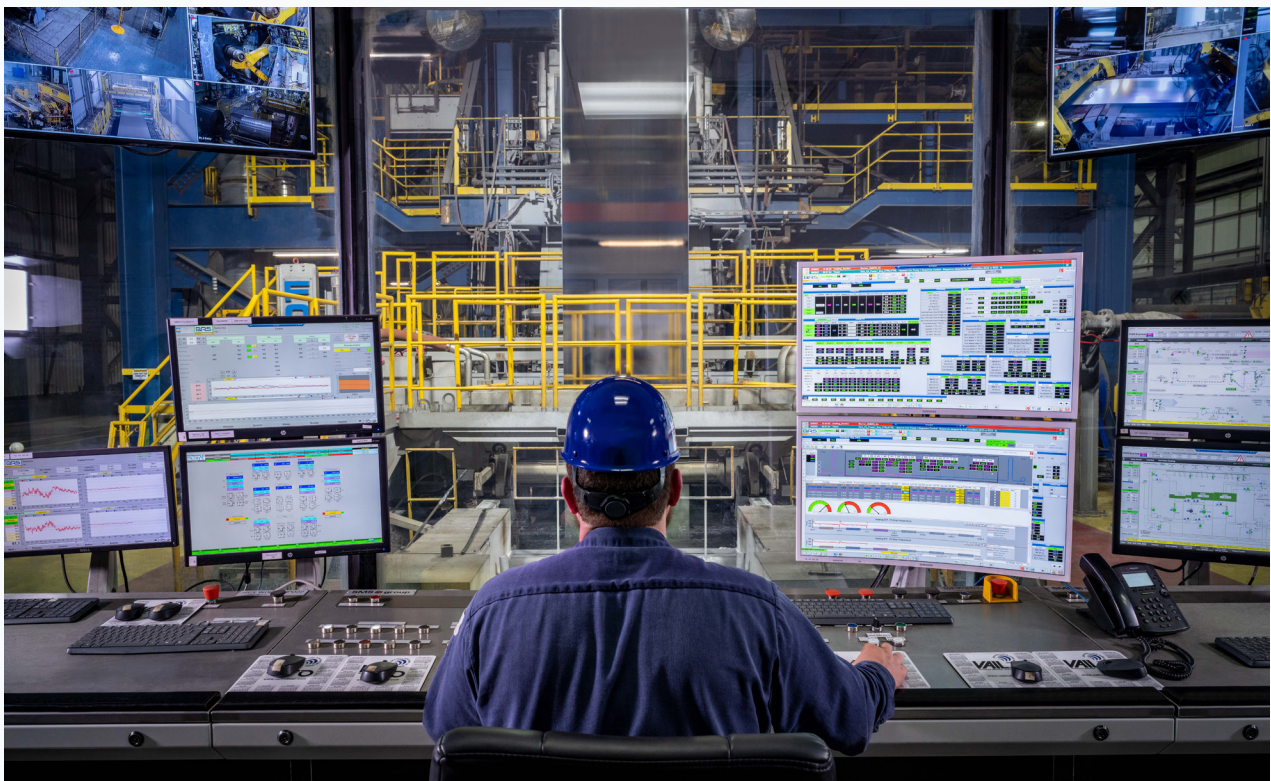


HOUSING

U. S. Steel produces long-lasting, durable steel roofing and siding. The steel from five recycled cars can make the frame for a home.

Reducing Steel’s Impact on the Environment

In 2023, 2 billion net tons of crude steel were produced globally, accounting for about 8% of global GHG emissions.**** Steel industry experts recognize that reducing the amount of fossil fuels used to produce steel is crucial to combating climate change, and U. S. Steel is actively working on ways to lessen steel manufacturing’s environmental footprint.



*Electric arc furnaces.
**Basic oxygen furnaces.
***<https://worldsteel.org/about-steel/steel-facts/>
****<https://worldsteel.org/media-centre/press-releases/2024/december-2023-crude-steel-production-and-2023-global-totals/>

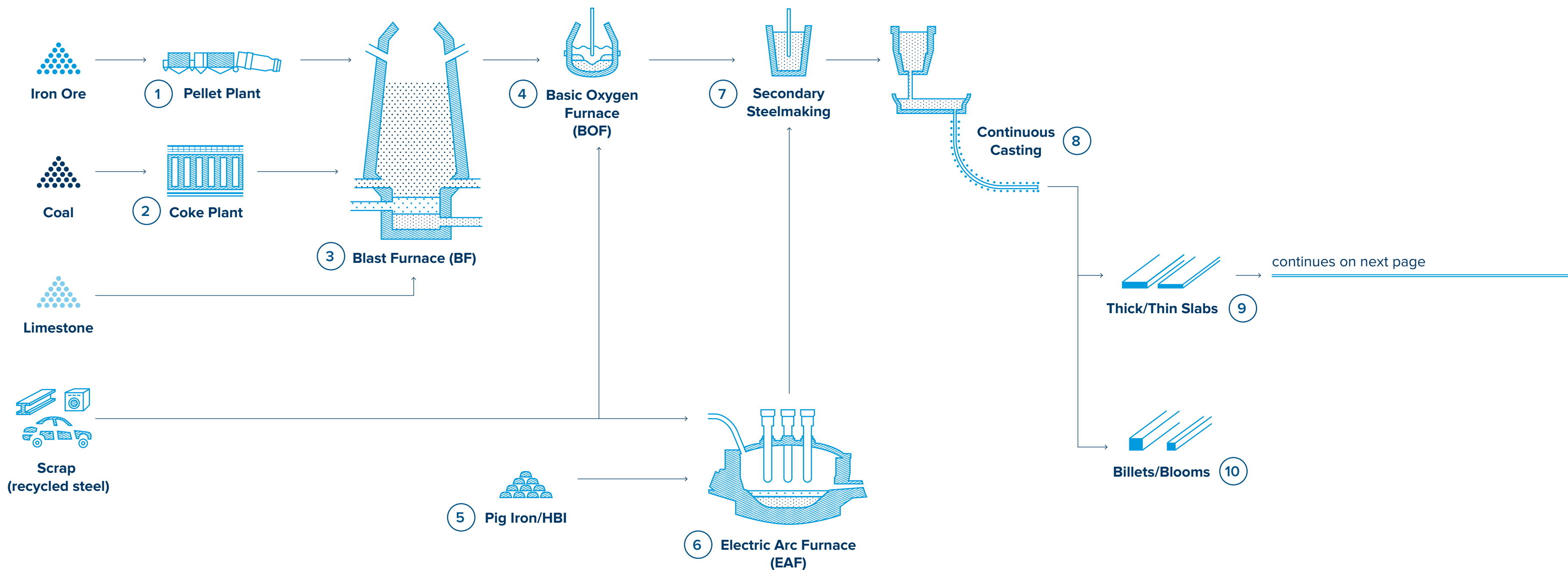
INTRODUCTION

How We Make Steel

Integrated Mills and Mini Mills

U. S. Steel uses two different processes for making steel: integrated and mini mill. The integrated process relies on blast furnaces and basic oxygen furnaces, while the mini mill process uses electric arc furnaces (EAFs). Each process uses different materials and energy sources, generating varying levels of GHG emissions.

U. S. Steel works hard to minimize the impacts of our steelmaking processes. Our company is developing capabilities to produce steel with lower GHG emissions that meets all the performance standards of our existing steel grades. Read more about our sustainable steels in our Inspiring Innovation section starting on [page 21](#).



Definition of Terms

- 1 Pellet Plant:** A unit that processes mined raw iron ore into iron ore pellets suitable for use in a blast furnace or direct reduced iron plant. It includes crushing, grinding, flotation, and heating/firing to form the pellet.
- 2 Coke Plant:** A unit that converts mined coal into coke by baking the coal in a non-oxidizing atmosphere.
- 3 Blast Furnace:** A vertical shaft furnace used for smelting liquid iron from iron ore pellets through heating and chemical reduction. Coke is used as the main fuel and reductant, while limestone is added to absorb impurities.

- 4 Basic Oxygen Furnace:** A furnace that works by blowing pure oxygen into it to convert liquid iron and steel scrap into liquid steel.
- 5 Pig Iron/HBI:** Pig iron is produced by solidifying liquid iron from a blast furnace into individual small ingots, or “pigs.” Hot briquetted iron (HBI) is produced in a direct reduction process, where iron ore pellets are heated and chemically reduced without melting. Both of these products are classified as Ore-Based Metallics or Scrap Substitutes.

- 6 Electric Arc Furnace:** A furnace that uses mostly electricity, supplemented by oxygen injection, to melt steel scrap and ore-based metallics into liquid steel.
- 7 Secondary Steelmaking:** A group of processes that process and modify liquid steel from either the BOF or EAF to meet the final chemical and quality requirements through alloying, temperature adjustments and rinsing with argon.
- 8 Continuous Casting:** A process that takes the liquid steel and solidifies it, with the shape of the semi-finished product determined by the shape of the caster molds.

- 9 Thick/Thin Slabs:** Output of a continuous caster where the width is much larger than the thickness, and used for sheet and plate products.
- 10 Billets/Blooms:** Output of a continuous caster where the width and thickness of the product is similar. The cross-section can be square, rectangle, or round, and the blooms are used for seamless pipe and long products.

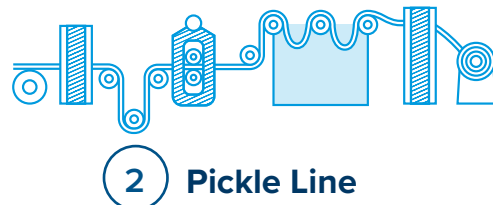
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How We Make Steel

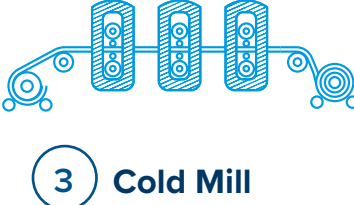
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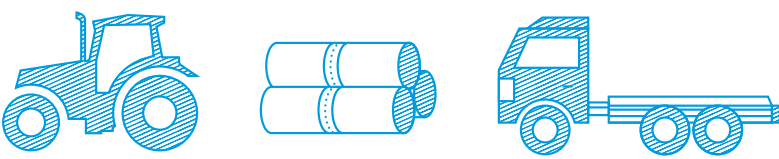
1 Hot Strip Mill



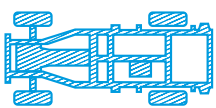
2 Pickle Line



3 Cold Mill



Hot Rolled Product



Hot Rolled Pickle & Oiled Product



Hot Dip Coated Product



Pre-Painted Product



Cold Rolled Product



Tinplate Product



Tin Free Steel Product

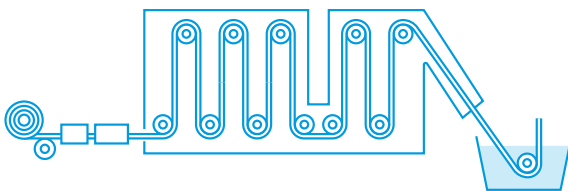


Non-Grain-Oriented (NGO) Product

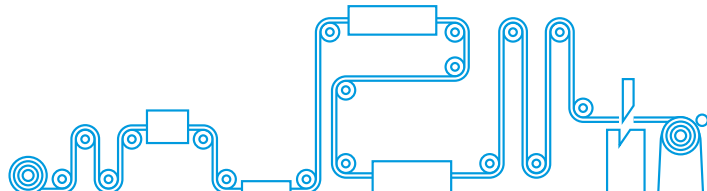
Definition of Terms

- 1 **Hot Strip Mill:** A unit that reduces the thickness of the slab and rolls the material into a hot rolled coil by heating the slab up then rolling. The hot strip mill can be a standalone unit (at our integrated plants) or connected to the slab caster (at our mini mills).
- 2 **Pickle Line:** A line that cleans the surface of the sheet after hot rolling.
- 3 **Cold Mill:** A unit that further reduces the thickness of the sheet, performed at ambient temperature. The cold mill is often coupled with the pickle line. The product off of the mill is called Cold Rolled Full Hard (CRFH).
- 4 **Hot Dip Galvanizing Line:** A line that applies a zinc-based coating (Galvanize, Galvanneal, GALVALUME®) to the surface of the steel to provide corrosion protection. Lines also include a continuous annealing section for heat treatment of the strip.
- 5 **Paint Line:** A line that applies paint to the surface of the galvanized strip.

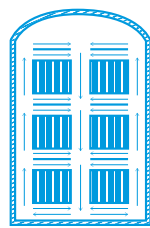
- 6 **Batch/Box Annealing:** A process that takes the CRFH coil and heat treats it over a period of days to recover formability, where the product remains as a coil throughout the process.
- 7 **Temper/Skin Pass Mill:** A mill that provides stiffness and surface finish to steel after it is annealed. For uncoated annealed product, the final product is cold rolled.
- 8 **Continuous Annealing Line:** A line that takes the CRFH coil and heat treats it over a period of minutes by unwinding the coil. Because the heat treatment is done only on the thickness of the sheet, the steel can be heated and cooled rapidly.
- 9 **Electrotinning Line:** This line uses electricity to apply a thin coating of tin to an annealed and temper rolled strip to produce tinplate.
- 10 **Tin Free Steel Line:** This line uses electricity to apply a chromium/chrome oxide coating to an annealed and temper rolled strip to produce tin free steel.
- 11 **Non-Grain-Oriented Line:** This line takes CRFH and performs a specialized continuous annealing step to produce non-grain-oriented electrical steels.



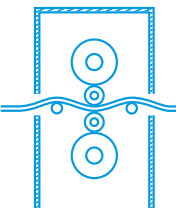
4 Hot Dip Galvanizing Line



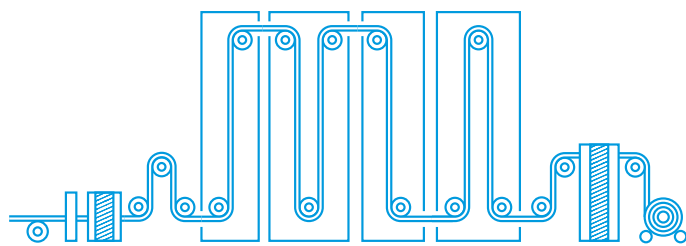
5 Paint Line



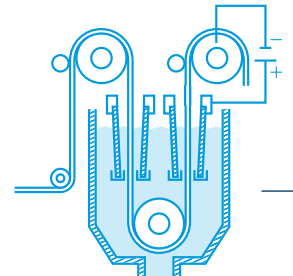
6 Batch/Box Annealing



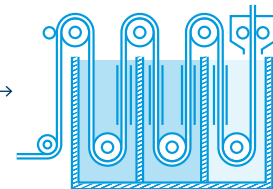
7 Temper/Skin Pass Mill



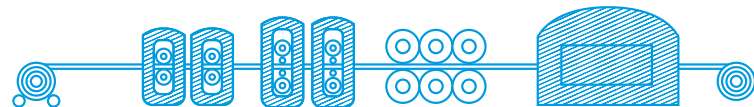
8 Continuous Annealing Line



9 Electrotinning Line



10 Tin Free Steel Line



11 Non-Grain-Oriented Line

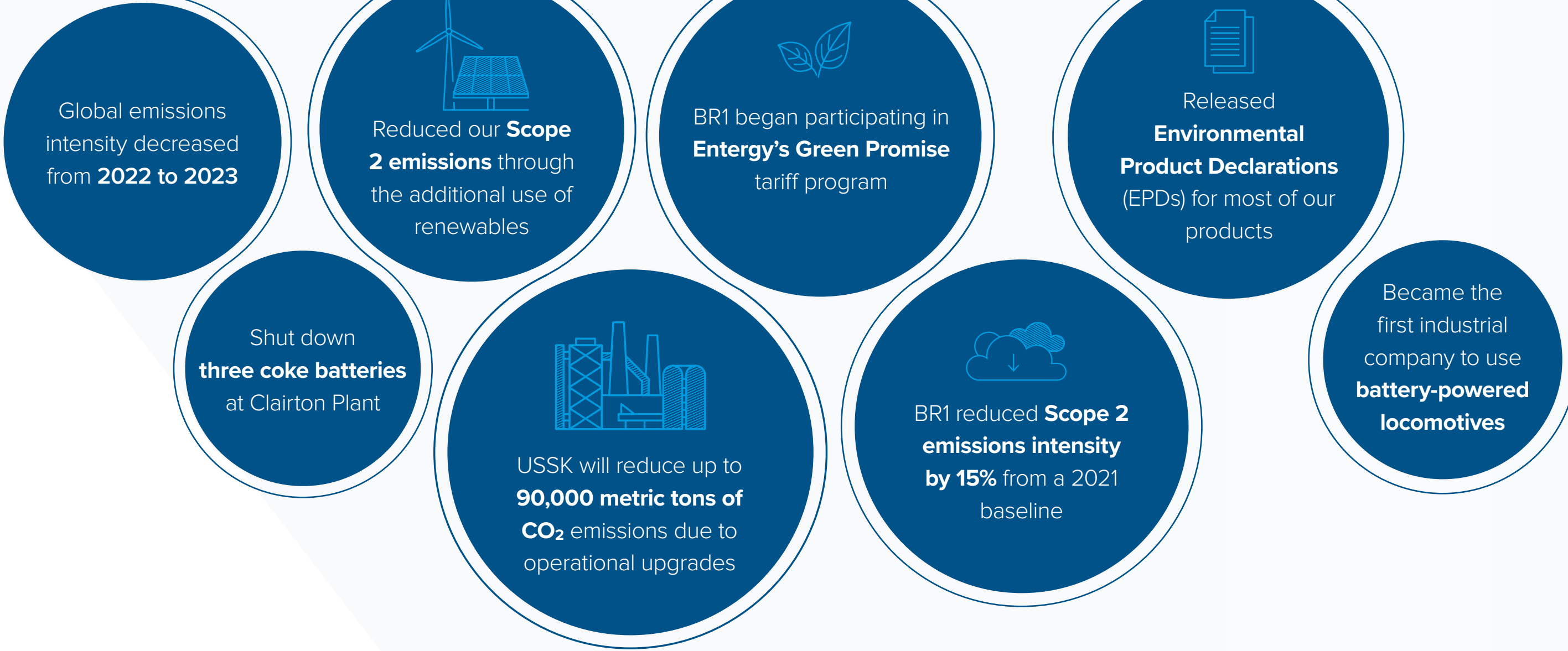
Decarbonization at U. S. Steel

Goals

- + Reduce emissions intensity* by 20% by 2030 based on 2018 baseline
- + Achieve net-zero* GHG emissions by 2050

*Scope 1 and 2

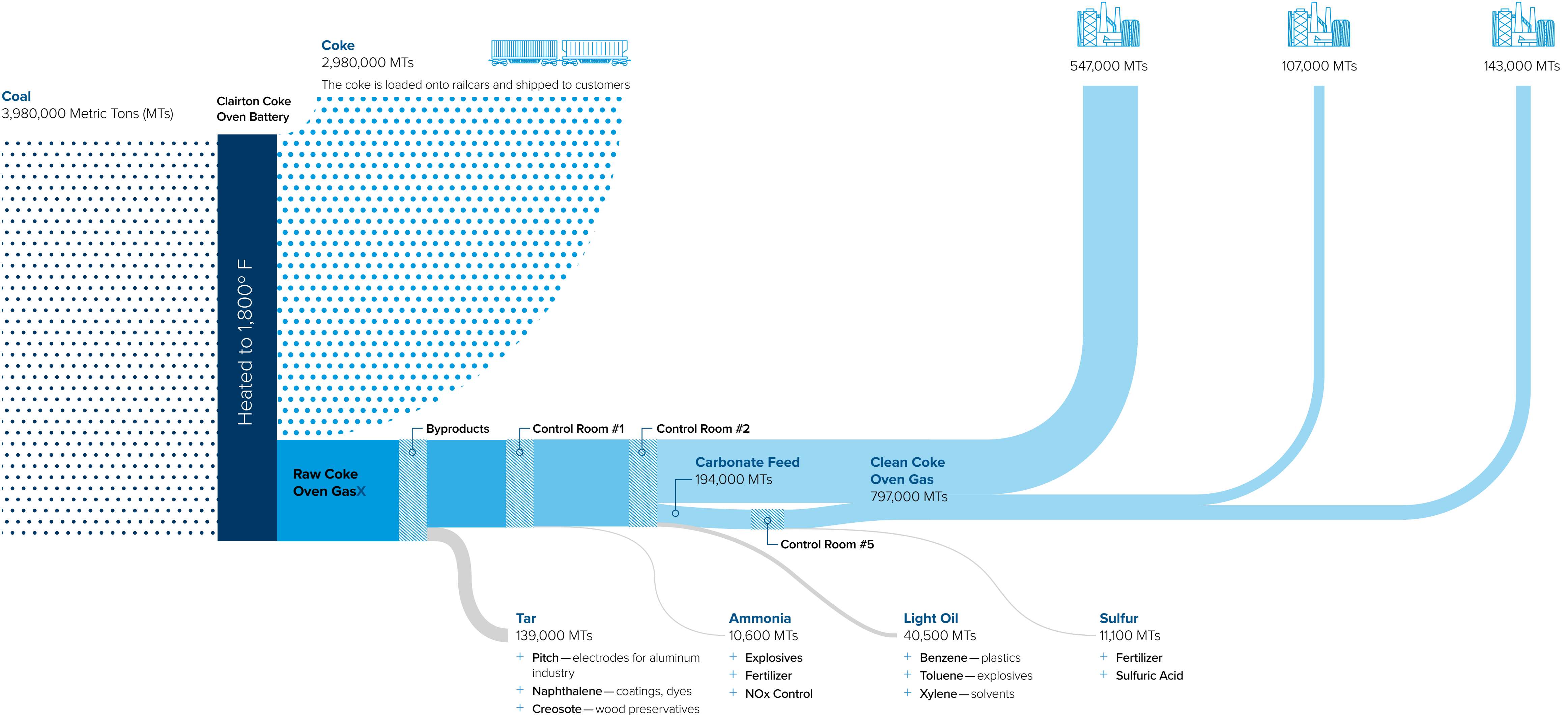
Progress



Looking Forward

- + U. S. Steel's Big River Steel 2 (BR2), our second mini mill, is expected to start up in 2024
- + U. S. Steel's Big River Steel Works will be able to receive up to 250 MW of solar power from the Entergy Arkansas Driver Solar project beginning in 2024
- + Partnering with GTI Energy and the Department of Energy (DOE) to test an engineering-scale ROTA-CAP™ CO₂ capture system on real flue gas conditions at our Edgar Thomson facility
- + Working with the National Energy Technology Laboratory (NETL) to develop a thin film composite (TFC) membrane for industrial carbon capture for testing at our Edgar Thomson facility in 2025
- + Collaborating with Molten Industries Inc. and the DOE to integrate clean hydrogen produced via methane pyrolysis to reduce iron ore to iron in a direct reduction process in our blast furnaces
- + Partnering with Carnegie Mellon University to increase the Technology Readiness Level of the hydrogen-based direct reduction of iron oxide (DRI) process
- + Utilizing CarbonFree's SkyCycle™ technology at our Gary Works facility to capture and mineralize up to 50,000 metric tons of CO₂ per year

Circularity and Waste Diversion at Clairton



*Values are calculated using multiple decimal points, and the amounts shown here are rounded up.