BUILDING AMERICA'S STEEL ADVANTAGE:

HOW DIRECT REDUCED IRON WILL STRENGTHEN THE STEEL INDUSTRY

EXECUTIVE SUMMARY

The United States is the fourth-largest steelmaker in the world, largely because of ample availability of scrap steel and advancements in scrap-based steelmaking. However, scrap-based steel alone can't meet the purity specifications required for critical products like automotive sheet and electrical steel; for that you also need virgin iron inputs. American electric arc furnace (EAF) mills rely on imported virgin iron to fill this need, while integrated mills produce iron domestically using blast furnaces, an outdated, heavily polluting, and inflexible technology. This current operating structure of the domestic iron and steelmaking industry thus leaves the industry exposed to volatile markets, pollutes communities, and constrains long-term competitiveness. Building a more self-sufficient and resilient industry will require investing in domestic capacity to produce these iron units in a more cost-competitive, clean, and flexible manner.

A blast furnace at Edgar Thomson Steel Works in Braddock, Pennsylvania.

As an environmental organization, NRDC sees this as more than an industrial policy problem; it is a missed opportunity to also cut pollution. We seek a clean and competitive industrial sector that supports healthy communities and a resilient economy. Clean technologies that are also economically viable are the surest path to strengthening domestic industry while reducing pollution.

For the U.S. steel industry, the most prominent such technology is direct reduced ironmaking (DRI), which can produce iron domestically while emitting significantly less pollution than conventional ironmaking. Expanding domestic DRI production through policy action would therefore serve two goals at once: reducing the industry's reliance on iron imports and cutting its climate and environmental pollution.

Iron is an important input for steelmaking, whether that steel is produced through the scrap-based EAF pathway or the coal-based blast furnace–basic oxygen furnace (BF-BOF) pathway. Most steelmaking in the United States has shifted from BF-BOFs to EAFs due primarily to the economic advantages and operational improvements of EAFs.[1] But this transition has not eliminated the steel industry's reliance on virgin iron. To produce higher-quality, higher-margin products and to dilute contaminants present in the growing supply of lower-quality scrap, EAFs are relying more and more on virgin iron inputs to produce steel.[2] Because the United States does not produce enough virgin iron domestically to meet this need, EAF steelmakers rely heavily on iron imports from just two countries, leaving the industry vulnerable to supply chain shocks, as evidenced by the 46 percent increase in pig iron import prices after the start of the Russia–Ukraine war.[3]

So, how should the United States produce more iron domestically? Virgin iron is made through one of two pathways: pig iron production via blast furnaces or DRI production. Our evaluation of these two pathways shows that DRI is more competitive. We assess competitiveness on the basis of six factors: access to raw materials, low capital expenditures, low operating expenditures, high operational flexibility, ability to produce high-quality steel, and low exposure to environmental policy and regulatory risks. DRI performs particularly well on operating costs, flexibility, and environmental performance relative to blast furnaces. Most DRI capacity in the United States currently relies on natural gas, and DRI's emissions advantage will grow further in the future if natural gas is partially or fully replaced with clean hydrogen. DRI is therefore positioned as the leading near-term pathway within the broader global shift toward clean iron production and markets preferring lower-carbon goods.

DRI has clear economic, operational, and environmental advantages over pig iron from blast furnaces but has not yet achieved meaningful scale within the U.S. steel industry, held back primarily by the capital costs of new facility construction and limited domestic production of higher-grade iron ore pellets that improve the efficiency of DRI in downstream steel production.

Targeted policy intervention is needed to overcome the barriers that slow the build-out of new industrial capacity and to ensure that growth happens in a way that protects workers and communities. Such intervention will accelerate the transition of the domestic iron and steel industry toward a more economic and resilient pathway while also ensuring important labor and environmental protections.

To accomplish the task of building out DRI production in the United States, we recommend a suite of policy levers organized around strengthening supply, building demand, and ensuring that the transition benefits workers and communities (figure ES-1).

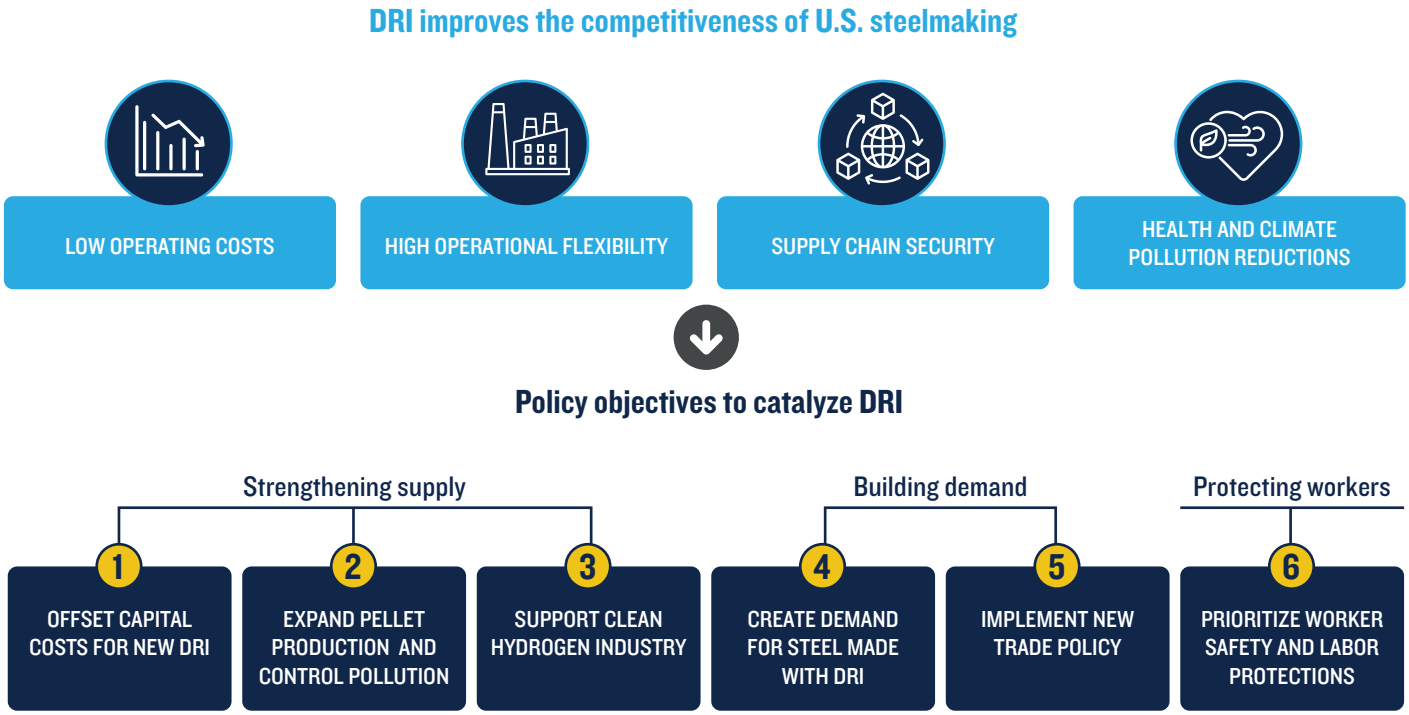
STRENGTHENING SUPPLY:

1. **Offset capital costs for new DRI facilities.** The capital costs of building a new DRI facility are lower than the cost of a new blast furnace, and the DRI-EAF process has lower operating costs than the BF-BOF process. Still, a significant cost barrier remains to build any large, new industrial facility. Public support to lower these capital costs can spark new DRI build-out.
2. **Expand pellet production while controlling pollution.** DRI production can benefit from higher-grade iron ore pellets compared to blast furnaces due to efficiency considerations in downstream EAF steelmaking processes. Policies can motivate upgrades to pelletizing operations to produce higher-grade pellets while also maintaining and strengthening pollution standards around ore processing to protect people and the environment from harmful chemicals such as mercury.
3. **Support the growth of a domestic clean hydrogen industry.** Clean hydrogen production would support resiliency in DRI production (hydrogen-ready DRI plants can switch from natural gas to hydrogen as hydrogen prices decrease). It would also prepare domestic products to compete in markets created by international policies such as the European Union's Carbon Border Adjustment Mechanism (CBAM) to prioritize cleaner manufacturing. Policies that invest in domestic clean hydrogen production now will ensure a sufficient supply of affordable, clean hydrogen in the future.

BUILDING DEMAND:

4. **Create demand for steel produced with DRI.** DRI production currently makes up a small but growing portion of ironmaking in the United States. Policies that create demand for steel produced from DRI will accelerate the growth of the DRI market and thereby encourage DRI production.
5. **Implement new trade policy.** Steel produced from DRI has much lower associated carbon and other pollutant emissions than steel produced from blast furnace–made pig iron. Globally, markets that prefer lower-carbon goods are

FIGURE ES-1: OVERVIEW OF THIS REPORT: EVALUATION OF THE U.S. STEEL INDUSTRY'S COMPETITIVENESS AND POLICY RECOMMENDATIONS



already being created via EU CBAM. The United States can design complementary trade policies that disincentivize imports of steel products with high associated carbon and other pollutant emissions to further drive demand for domestic DRI production.

PROTECTING WORKERS:

6. **Prioritize worker safety and labor protections.** A strong steel industry requires a strong workforce. Policies must promote good labor practices that prioritize family-sustaining wages, stable employment, workforce training, and worker safety.

Expanding domestic DRI production is central to unlocking the full potential of the U.S. steel industry. A reliable domestic DRI supply will further enable the production of high-quality steel, improve supply chain resilience, and position domestic producers for a future shaped by evolving market and policy dynamics. By scaling domestic DRI capacity, the United States will not only close a critical input gap but also build a more competitive, secure, and forward-looking steel industry.

ENDNOTES

1 Sam Bailey et al., *Decarbonization Pathways and Policy Recommendations for the United States Steel Sector*, Clean Air Task Force, 2025, 25, https://www.catf.us/resource/decarbonization-pathways-policy-recommendations-united-states-steel-sector/.

2 Ibid., 16, 25, 29–30.

3 U.S. Department of Commerce, Census Bureau, "U.S. International Trade Commission's DataWeb," accessed June 22, 2026, https://dataweb.usitc.gov/; David Guberman, "Russia, Ukraine, and Pig Iron Supply," U.S. International Trade Commission, October 2022, https://www.usitc.gov/publications/332/executive_briefings/ebot_russia_ukraine_and_pig_iron_supply.pdf; *S&P Global,* "US Tariff Proposal Threatens Brazilian Pig Iron, Risks Hurting Steelmakers," June 25, 2026, https://www.spglobal.com/energy/en/news-research/latest-news/metals/062526-us-tariff-proposal-threatens-brazilian-pig-iron-risks-hurting-steelmakers.