

Memo Focus: Illinois

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Illinois overview

Illinois is the third largest steel producer in the Great Lakes and accounts for roughly [5% of US steel production](#). The state is home to five separately owned EAFs in the northern half of the state and a single integrated BF-BOF facility in Granite City owned by US Steel. Based on historical investment trends, at least one blast furnace at Granite City is currently due for a reline investment. US Steel's mines in Minnesota supply iron ore, and the adjacent coke plant owned by SunCoke and Gateway Energy supplies coke. Illinois is also home to the only standalone BOF facility in the country, a small-scale steel production facility that leverages iron material processed at the nearby blast furnaces in Indiana.

Figure 1: Illinois steel and related assets

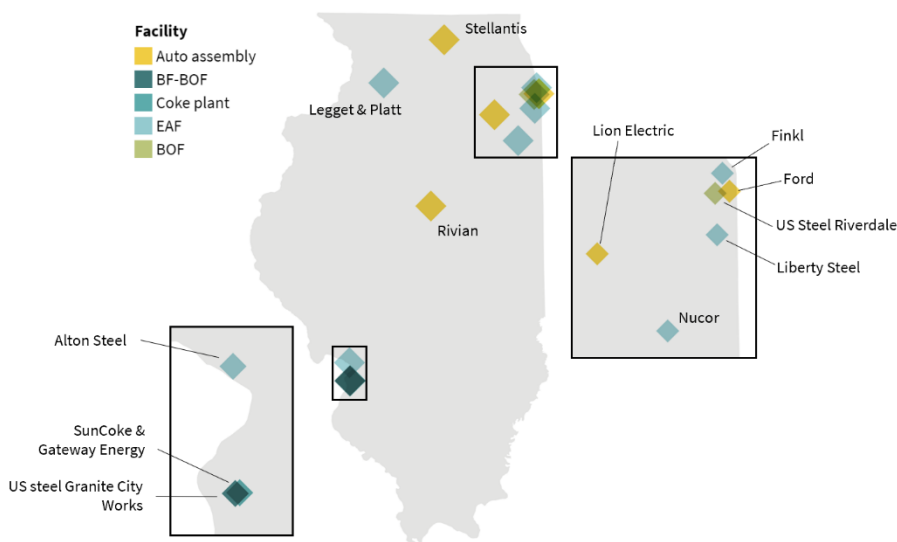


Table 1: Steel supply chain production capacity

Product	Type	State production capacity (million tons)	Great Lakes production capacity (million tons)
Raw material	Iron ore pellets**	0	41
Raw material	Coke	0.7	11.6
Intermediate material	Direct reduced iron (DRI)	0	1.9
Steel (recycled)	Electric arc furnace (EAF)	4.5	28
Steel	Blast furnace-basic oxygen furnace (BF-BOF)	2.8*	36

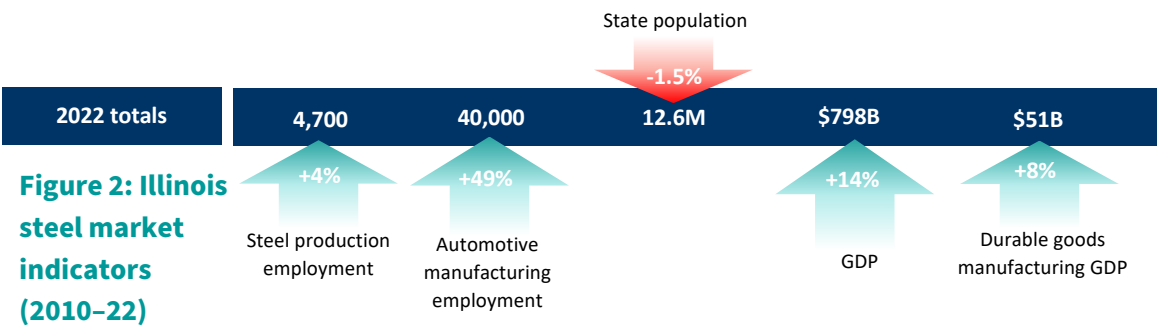
*2.8 million tons reflects Granite City Works production capacity ignoring recent idling.

** State and Great Lakes production capacity reflect production volumes for 2022.

The two driving legislative policies addressing climate in Illinois are the [Climate and Equitable Jobs Act](#) and the [Illinois Department of Natural Resources Climate Action Plan](#). Neither policy directly addresses heavy industry, but both include labor and clean energy directives (renewable energy incentives, workforce training programs among others) to support a near-zero-emissions steel industry in Illinois. The state of Illinois and its two largest metropolitan areas (St. Louis and Chicago) have been collectively awarded \$3 million in funding through the [Climate Pollution Reduction Grant Program](#) to update their climate action plans, which will help advance the existing policies.

Current issues and impact

In June 2022, [US Steel signed a non-binding letter of intent to sell the Granite City facility to SunCoke Energy Inc.](#) During the 10-year sale period, SunCoke would reinvest in the blast furnaces, idle the BOF and steel rolling/forming activities, and supply US Steel pig iron for use in EAFs. However, as the largest employer in Granite City, US Steel faced union resistance to selling the facility, and the deal has failed to move forward. Additionally, both blast furnaces on-site are currently idled, [in part due to recent automotive union worker strikes](#). Coke and steel production facilities, largely due to their reliance on coal, are responsible for considerable emissions of [hazardous](#) and [criteria](#) air pollutants. In 2018, after years of Clean Air Act violations at Granite City Works and the adjacent coke plant, SunCoke and US Steel were ordered to pay [\\$4.26 million in a class action settlement involving over 4,000 local residents](#).



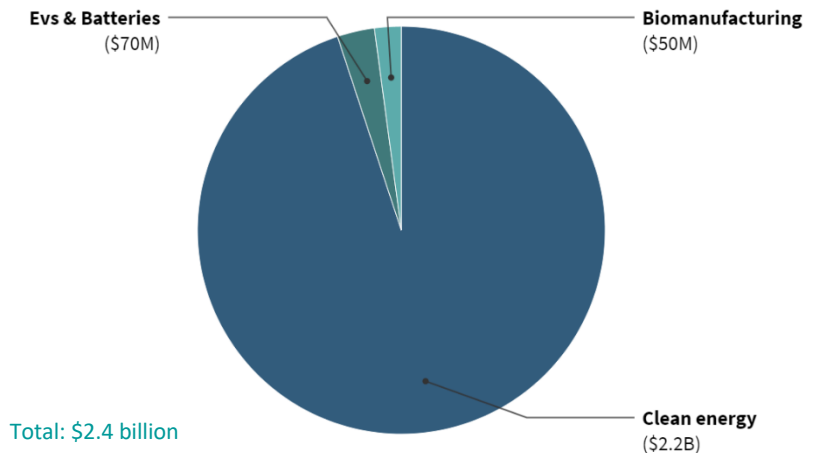
Note: GDP metrics are measured in 2012 chained dollars
Data source: Bureau of Economic Analysis, United States Census Bureau. United States Regional Economic Analysis Project

Figure 2 highlights steel industry market indicators for the state of Illinois and how they changed from 2010 through 2022. Despite a slight population decline, employment in the steel sector has trended upward since 2010, although this could be significantly impacted pending the results of the SunCoke deal at Granite City. Automotive manufacturing employment in Illinois has increased nearly 50% since 2010, one of the highest growth rates across the Great Lakes. The automotive market accounts for roughly 25% of the US steel demand and leads all domestic off-take sectors in terms of low-emissions steel purchasing commitments, [approximately 3.2mt by 2030](#).

Steel development opportunities in Illinois

Figure 3 shows the private clean manufacturing investments made in Illinois since the passing of the Inflation Reduction Act (IRA) in 2022. Although Illinois has successfully developed its automotive manufacturing market over the past decade, only one new facility has been added in the wake of the new legislation. Canadian manufacturer Lion Electric opened a 900,000-square-foot EV production facility in Joliet, [the largest of its kind in the United States](#), and is expected to produce [20,000](#) medium and heavy-duty vehicles annually. Neighboring states such as Michigan, Indiana, and Ohio recorded drastically larger automotive manufacturing investment in the same period (\$19.5 billion, \$7.8 billion, and \$8.4 billion, respectively), helping increase the regional automotive manufacturing capacity.

Figure 3: Post-IRA clean manufacturing investments in Illinois



Data source: Climate Power, US White House.

Note: data sources leverage information from public announcements, investment totals may not be comprehensive

Clean energy manufacturing has dominated private investments following the IRA in Illinois. Clean energy developers have started to signal demand for low-emissions steel products via several methods and are expected to be responsible for nearly [10% of low-emissions steel demand by 2030](#). Given the magnitude of local and regional demand in the clean energy and automotive manufacturing sectors, investment in near-zero-emissions steel in Illinois would be well positioned.

The Granite City blast furnaces are due for reline investments. These investments are critical junctures for steel producers deciding between locking in current coal-based production methods or investing capital in new emissions reduction technologies, such as DRI, using hydrogen or natural gas paired with carbon capture and storage (CCS). Converting US Steel's BF-BOF in Granite City to hydrogen-based DRI-EAF production methods has the greatest potential to cost-effectively reduce greenhouse gas emissions and local air pollution. Achieving the greatest possible emissions reduction is not only essential from the climate perspective but also crucial for steel producers seeking to capitalize on [premiums for near-zero-emissions steel products developing in the market](#).

Granite City Works is well-positioned to transition to DRI production, particularly given a [soon-expiring coke supply contract](#), access to DR-grade pellets (USS is investing [\\$150 million in producing DR-grade pellets](#) at one of its Minnesota facilities), and growing demand for hot briquetted iron from the large concentration of EAFs

in Illinois and neighboring states.¹ In addition to lowering costs associated with permitting, siting, and local infrastructure (port, highway, railroad, and energy interconnection), brownfield hydrogen DRI-EAF investment could achieve greater retention of [supply chain and individual site employment](#) so long as some of the upstream and downstream activities are collocated, which is currently common practice in the steel industry. With the impending sale to SunCoke threatening the [loss of 900–1,000 union jobs](#), investing in a hydrogen-based DRI-EAF facility on the Granite City footprint would provide meaningful job protection to the local steel workforce and the downstream businesses that rely upon it.

If the blast furnaces are relined at Granite City, CCS implementation is a feasible option for reducing emissions from the facility. CCS abatement potential is limited to approximately 60%, but the infrastructural complexities of retrofitting CCS technology onto all the individual point sources on-site may bring this percentage down considerably. For all CCS pathways, whether at a BF-BOF or new DRI facility, capture rates must be maintained at high levels (90% or greater) and upstream methane leakage from fossil sites (coal mines and natural gas wells) must be accounted for and certified. CCS projects will also require close monitoring and regulation of subsurface storage and pipeline infrastructure to mitigate leaks and malfunctions. To date, no BF-BOF facility globally operates commercial scale CCS systems. The relative cost and timelines associated with these types of asset transitions are included in Table 2.

Table 2: Potential near-zero-emissions steel production pathways in Illinois

Production pathway (2 mt/year)	Investment capital (\$billion)		Emissions reduction potential		Projected timeline (years)
	H ₂	CCS	H ₂	CCS	
CCS development at Granite City Works	N/A	1.3	N/A	46–59%*	2
BF-BOF → DRI-EAF asset conversion at Granite City Works	1.2	1.7	68–86%	57–79%	3+
DRI-EAF (inc of new casting & rolling)	1.8	2.3	68–86%	57–79%	3+

Note: Emissions reduction potential relative to unabated BF-BOF steel production. Emissions reduction potential based on scope 1, 2, and 3 emissions for hot rolled coil production. Range is a product of varying scope 2 emissions from US grid average (0.37 tCO₂/MWh) to dedicated renewable energy, varying pellet-making fuel from natural gas to pyrolysis oil and varying natural gas methane leakage rate from 1.2% to 2.5%. Assumed capture rate for all CCS technology is 90%, conservative figure yet to be proven at scale. Capital for hydrogen production pathways do not include upstream renewable energy or hydrogen assets. Classification as near-zero-emissions production is dependent on actual system configuration and realized emissions abatement.

** BF-BOF with CCS range reflects the option of applying capture technology to the adjacent SunCoke/Gateway Energy coke battery.*

Developing hydrogen and CCS infrastructure

In addition to attracting a rapidly growing clean energy economy, Illinois policymakers prioritize early manufacturing investments in the hydrogen space. In 2022, a [Hydrogen Economy Task Force](#) was established to support hydrogen hub development in the state and maximize federal incentives for hydrogen deployment. In October 2023, the Midwest Hydrogen Hub (MachH2), formed by Illinois, Indiana, and Michigan, was one of the seven hydrogen hubs across the United States selected to receive up to \$1 billion in funding

¹ HBI is a lower-carbon (compared with pig iron produced in a blast furnace) iron feedstock produced at DRI facilities and can be used in BOFs and EAFs for steel production.

from the DOE's \$7 billion [Regional Clean Hydrogen Hubs Program](#). Steel is a stated offtake sector for the hub, with two producers (ArcelorMittal and Cleveland-Cliffs) announced as part of the coalition, though specific plans have not been released. MachH2 will include hydrogen produced from fossil fuels coupled with carbon capture, renewable energy, and nuclear resources. Constellation Energy intends to use a portion of the funding to build a nuclear-powered clean hydrogen production facility at its 2.3GW nuclear power plant in LaSalle County. The plant is estimated to produce 33,450 tons of clean hydrogen annually. Federal guidance is yet to confirm whether clean hydrogen production from existing nuclear sites will qualify for IRA tax credits, which will be critical for ensuring the viability of this facility and other hydrogen projects seeking to use Illinois's nuclear capacity.

In terms of CCS development, Illinois is more advanced than most states in the country. The state received funding from the DOE for [two commercial scale injection and sequestration projects at the ADM ethanol facility in Decatur](#). Additionally, it received federal funding support for several feasibility and test sites through the [CarbonSAFE](#) Program. The Mount Simon Sandstone saline formation in the Illinois Basin is considered the [primary CO₂ storage](#) resource of the Midwest, with [demonstrated ability](#) to sequester 1 million tons of CO₂ per year and the potential to store up to 172 billion tons of CO₂. Despite abundant storage reserves and demonstrated injection, getting CO₂ into these sequestration sites has received pushback in the form of [community opposition](#), with many counties along a proposed CO₂ pipeline route passing [moratoria and resolutions opposing development](#) due to safety concerns. With the exception of [one act \(95-0018\) from 2007, directing the state to assume liability for sequestered carbon](#), Illinois lacks state legislation to address community health and safety concerns over carbon sequestration and transportation.

Supporting policy

Illinois is the second state in the United States to provide a [state-level tax credit for “zero-carbon” hydrogen](#) use in hard-to-abate sectors, with \$10 million per year provided in 2026 and 2027². So long as the electrolyzers employ hourly matching (if connected to the grid), industrial users of the hydrogen can qualify for Illinois tax credits in these two years. The tax credit does not rule out nuclear as a qualified clean energy source. In May, the Illinois Senate voted to lift a 1987 moratorium on newbuild nuclear power installments, which may signal a greater role of nuclear power for hydrogen production in the state in the medium to long term. In the fall of 2023, Governor Pritzker and Chicago Mayor Brandon Johnson announced the [Chicagoland Climate Investment Alliance](#). The Alliance is a diverse multi-stakeholder group focused on climate investment in the Great Lakes and aimed at building decarbonization, which could mean the advancement of low-carbon building materials demand in the region. Thus far, major investments in near-zero-emissions steel production in Europe and Canada have received public funding support from national and local governments. The US federal government has provided multiple cost share, tax incentive, and loan-based programs targeted at near-zero-emissions steel production, but further incentives and infrastructural support highlighted in Figure 4 are needed to expedite asset development.

² \$10 million of tax credit funding is unlikely to significantly assist cost competitiveness of near-zero-steel production at commercial scale.

Figure 4: Great Lakes near-zero-emissions steel policy gap analysis

Domains	Example Policy Instruments	Federal	MN	WI	MI	IN	IL	OH	PA
Strategic Coordination	Technology Roadmaps	Strong	Moderate	Moderate	Moderate	Weak	Moderate	Weak	Moderate
Production Instruments	R&D/Jobs/Production Tax Credits	Strong	Weak	Weak	Weak	Weak	Weak	Weak	Weak
Demand-Pull Mechanisms	Public Procurement/Product Standards	Strong	Strong	Weak	Weak	Weak	Weak	Weak	Weak
Cross-Sectoral Integration	Hydrogen support	Strong	Weak	Weak	Weak	Weak	Weak	Weak	Weak
	Clean Electricity support	Strong	Weak	Moderate	Moderate	Moderate	Moderate	Weak	Weak
	CCS support	Strong	Weak	Weak	Weak	Moderate	Weak	Weak	Weak
	Land availability	Moderate	Moderate	Moderate	Moderate	Weak	Moderate	Weak	Weak
	Workforce development	Moderate	Moderate	Moderate	Moderate	Weak	Strong	Weak	Moderate

Weak
 Moderate
 Strong

In the immediate future, the Granite City site will require a relining investment (projected 2027). Relining and installing a comprehensive CCS system will lock the Granite City asset into coal-based production for decades to come, without offering the highest emissions abatement potential. Alternative technologies (DRI) would help maintain and expand steel production and its related supply chain in Illinois, creating robust economic development pathways. Policymakers, economic development offices, and developers should focus on the following to bring near-zero-emissions steel production to Illinois.

- 1. Support synergistic colocation of hydrogen infrastructure with existing steelmaking capacity to ensure steelmakers capture hub funded H₂ production.**
- 2. Investigate additional methods, beyond the available hydrogen tax credits, that can de-risk near-zero-emissions steel development projects.**
- 3. Develop State CCS legislation to provide regulatory clarity around permitting and ownership requirements, and accelerate safe, adequate CO₂ transmission and storage across the state.**