

The State Industrial Policy Playbook

A Policy Guide for Low-Emission Heavy Industry

July 16, 2025



CLEAN AIR
TASK FORCE

CATF at a Glance

Founded in 1996.

A **global nonprofit** with offices in Boston, Washington, D.C., and Brussels with staff working virtually around the world.

Our Mission: Push the technology and policy changes needed to achieve a zero-emissions, high-energy planet at an affordable cost.

Our Vision: Meet the world's rising energy demand in a way that is financially, socially, and environmentally sustainable.



Speakers



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— Agenda

- **Key Industrial Subsectors**
- **Technology Pathways**
- **Policy Landscape and State Tools**
- **Conclusions**

Key Industrial Subsectors

— Industrial Profile

- U.S. industry* underpins **12M+ jobs** and **\$851B** in payroll, but is responsible for **12 percent of harmful air pollutants** and nearly a **quarter of national greenhouse gas emissions**
- Pollution remains high due to technical complexity of industry, high-temperature requirements, and fossil feedstock dependence
- **Industrial clusters** (e.g., Gulf Coast) support regional supply chains and labor, but concentrate environmental burdens
- **Industrial emissions have not declined** as rapidly as in power or transportation sectors, highlighting the need for targeted policies

**U.S. industry (defined as NAICS 31-33) includes manufacturing but excludes agriculture, mining, utilities, and construction.*

Pollutant	Emissions (tons)
Volatile organic compounds (VOCs)	1,200,000
Particulate matter (PM ₁₀)	450,000
Particulate matter (PM _{2.5})	525,000
Nitrogen oxides (NO _x)	1,100,000
Sulfur dioxide (SO ₂)	600,000
Carbon Monoxide (CO)	4,800,000
Lead & compounds	1,500
Ammonia (NH ₃)	150,000
Hazardous air pollutants (HAPs)	250,000
Greenhouse gases [metric, CO ₂ e]	1,460,000,000

Analysis by Synapse Energy Economics; sources:

U.S. EPA. 2024. National Emissions Inventory

U.S. EPA. 2023. Toxics Release Inventory

Shapiro, J.S. and Walker, R. 2018. "Why is pollution from US manufacturing declining? The roles of environmental regulation, productivity, and trade"

National Association of Manufacturers. 2023

U.S. EPA. 2024. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2022.

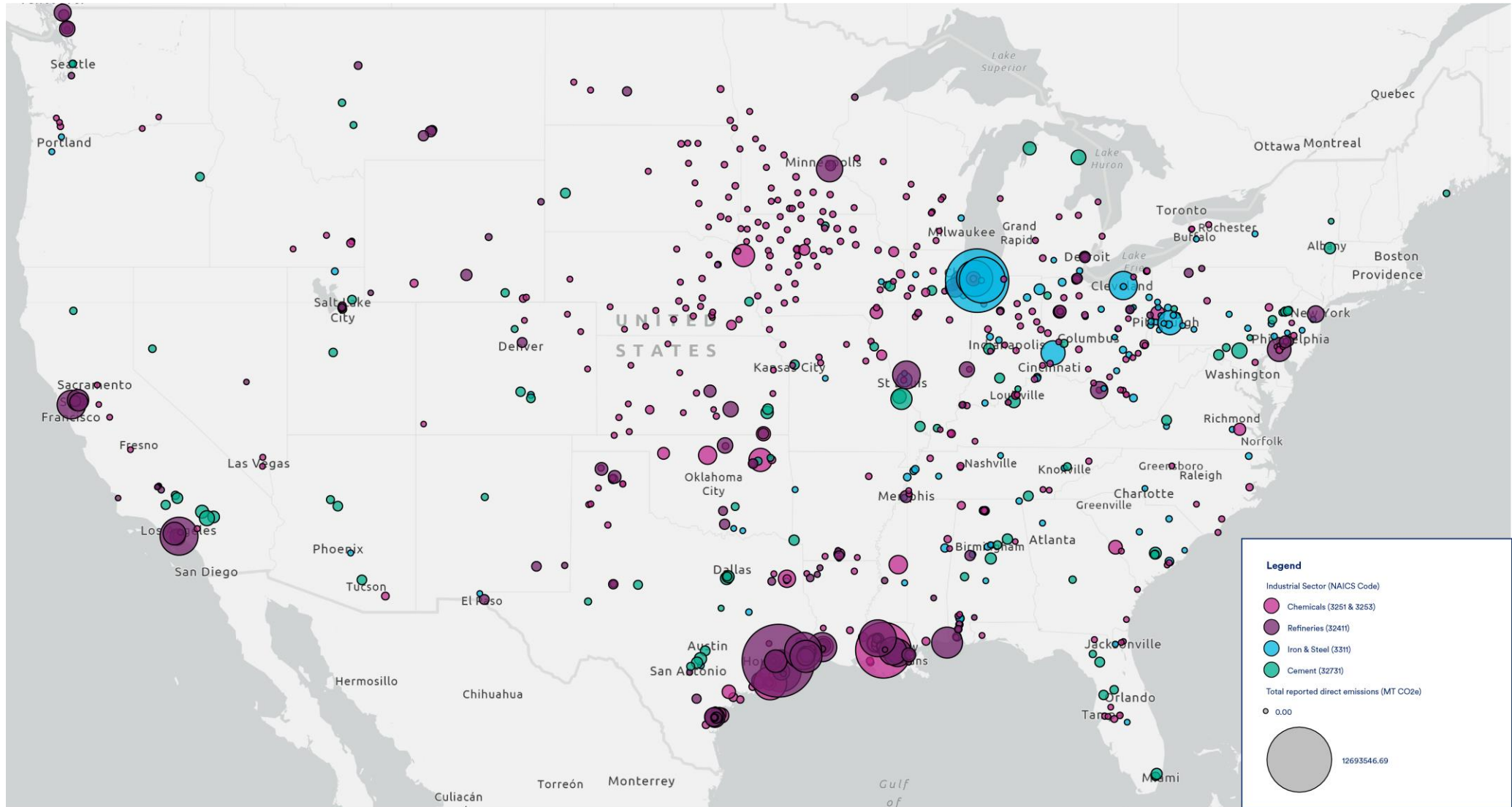
Congressional Budget Office. 2024. "Emissions of Greenhouse Gases in the Manufacturing Sector"

— Sectors of Focus



Sector	NAICS code	Number of employees	2022 Annual payroll, (\$ billion)	High-Emitting Facilities	2023 GHG Emissions, (MMT CO ₂ e)
Petroleum Refining	32411	51,386	8.04	130	181
Chemicals	3251 & 3253	198,155	21.01	509	175
Cement	32731	12,301	0.82	90	65
Iron and Steel	3311	77,665	8.32	121	59
Total		339,507	38.19	850	480

— Distribution of Direct GHG Emissions



— Benefits of Low-Emissions Industry

- Modernizing industry with low-carbon technology can revitalize communities hit by manufacturing decline, **reversing job losses and support new workforce opportunities** (22% of U.S. employment in 1979 → 8% in March 2025)
- Clean industrial projects **grow local tax bases and attract private investment**, fostering economic development and fiscal health
- **Global and domestic buyers increasingly demand low-carbon products**, making clean industry a competitive necessity and positioning the U.S. as a leader in exports
- Clean industry is a **pillar of national security**, supporting critical infrastructure and defense supply chains while reducing dependence on volatile global markets for materials and energy
- Provides direct **emissions reductions and associated health benefits**

Technology Pathways

Technological Readiness Levels for Decarbonization Technologies



Refining



Chemicals



Iron & Steel



Cement

Technology Pathway

Process electrification

Demo Stage

Demo Stage

Deployable

R&D stage

Carbon capture, utilization, and storage

Demo Stage

Deployable

Deployable

Demo Stage

Alternative production processes

R&D stage

R&D stage

R&D stage

Demo Stage

Feedstock substitutions

Deployable

Deployable

Deployable

Deployable

Alternative fuels

Deployable

Deployable

Deployable

Deployable

Energy and materials efficiency

Deployable

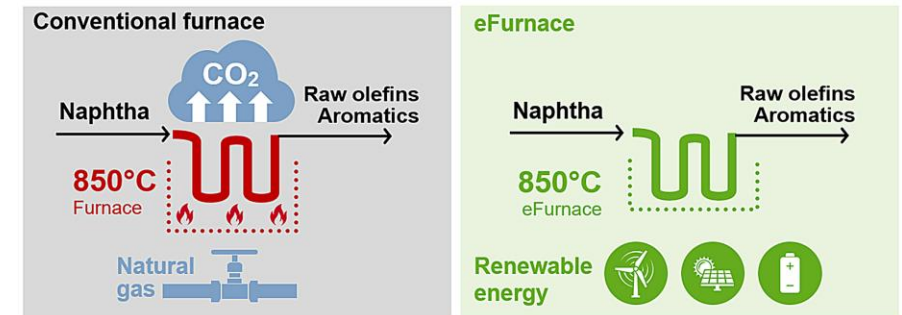
Deployable

Deployable

Deployable

— Process Electrification & Carbon Capture, Utilization, and Storage

- **Process Electrification:** Refers to the replacement of fossil-based heat and energy sources with electric technologies, ideally powered by affordable, zero-carbon electricity.
 - *Example: electric arc and submerged arc furnaces in steelmaking, electric kilns for cement, and electrified steam crackers*
- **Carbon Capture, Utilization, and Storage:** Refers to the capture of carbon emissions with two possible end uses: permanent sequestration or utilization.
 - *Example: CCS on steam methane reforming (hydrogen production) for chemicals and refineries, CCS on combustion & process emissions from cement kilns.*



Source: [BASF](#)

— Alternative Processes and Feedstock Substitutions

- **Alternative Production Processes:** Fundamentally new methods of manufacturing industrial materials that break from traditional fossil-fuel-based pathways.
 - *Example: hydrogen-based directly reduced iron in steelmaking, electrochemical cement production, and non-fossil feedstock-based chemical processes*
- **Feedstock Substitutions:** Replacement of conventional raw materials with lower-carbon, recycled, or bio-based alternatives.
 - *Example: scrap steel in steelmaking, fly ash and slag in cement*

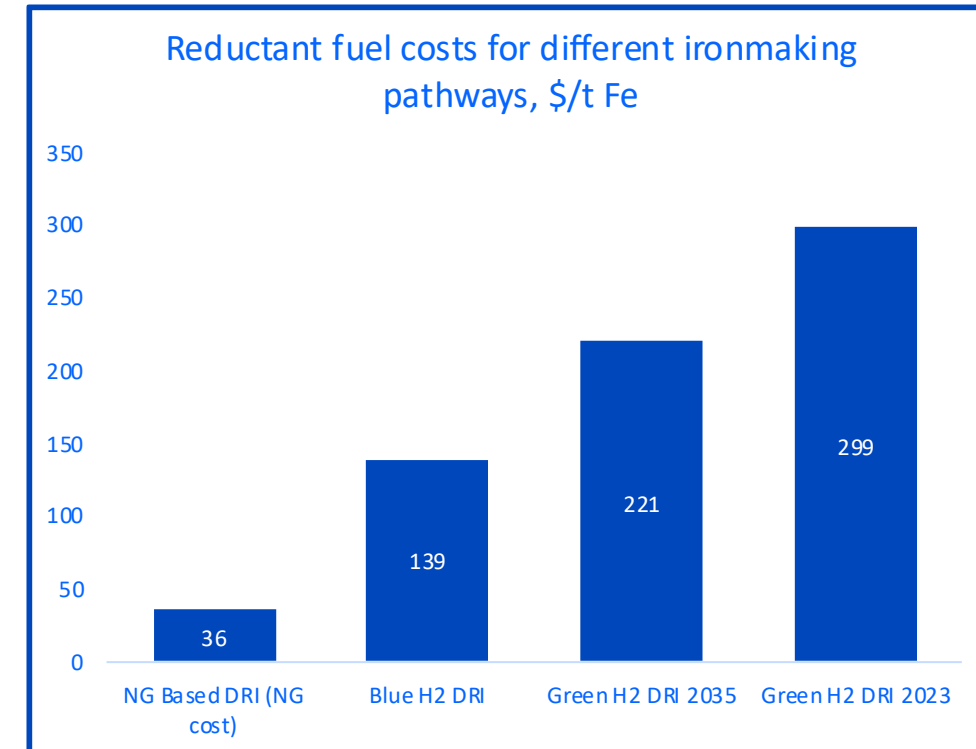
Overview of representative clinker substitutes

Substitute material	Est. cost, \$/tonne ¹	Substitution range, % ²
 Clinker	69	N/A
 Limestone	7	5-15%
 Fly ash	42	30-35%
 Ground Granulated Blast Furnace Slag	55	45-95%
 Natural pozzolans	11	30-40%
 Calcined clay	31	30-40%

Source: [US DOE](#)

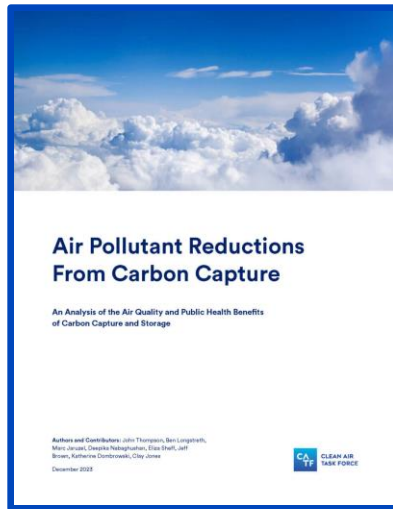
— Alternative Fuels, Energy & Materials Efficiency

- **Alternative Fuels:** Energy sources used to replace conventional fossil fuels that can lower carbon intensity of generating industrial heat.
 - *Example: Biomass-derived fuels, low-carbon hydrogen, and synthetic e-fuels are still developing. Some waste-derived fuels and conventional biofuels are already commercially available.*
- **Energy & Materials Efficiency:** Encompasses a range of strategies aimed at reducing the energy and resource intensity of industrial production.
 - *Example: equipment upgrades, process optimization, and the more efficient use of materials*



Source: [CATF & CRU](#)

— CATF Industrial Analysis



Policy Landscape and State Tools

— Federal Policy Context

- **Federal investments have catalyzed \$321 billion** in private capital for clean energy and industrial projects.
- The **IJA and IRA** spurred clean energy investment through funding for infrastructure, pilots, and demonstrations; expanded tax credits; cost-sharing and loan programs; and new federal offices for implementation.
- The **One Big Beautiful Bill** impacts clean energy tax credits including by accelerating the phase-outs for wind, solar, and hydrogen credits, while imposing stricter domestic content and sourcing rules that will impact all clean energy credits.
- **Federal policy and funding uncertainty** has led to project delays, cancellations, and a slowdown in clean energy investment.
- **Federal-state coordination is critical** to leverage available funds and ensure long-term market signals for industry.

— State Policy Trends

- Low-emission industry policies support **economic growth, emissions reduction, competitiveness, and technology innovation.**
- States across the political spectrum are showing industry policy leadership and tailoring policies to key industrial sectors.
- States can tailor policy tools to their unique industrial mix to maximize effectiveness.

General Policy	State Example	Policy Context	Target Industries
State Tax Credits to Augment Federal Support	New Mexico Advanced Energy Tax Credit	Supplements the federal 45X advanced manufacturing production tax credit with a 20 percent investment tax credit for eligible facilities	All sectors
Targeted State Support for Lower-TRL Technologies	Arizona Electrified Processes for Industry Without Carbon (EPIXC)	A clean energy manufacturing innovation institute dedicated to decarbonizing process heat	All sectors
Environmental Product Declarations (EPDs)	Oregon, Minnesota, Georgia	Provide technical assistance programs that support development of product lifecycle assessments without mandating their use	Cement, steel
State Material Embodied Emissions Standards	Buy Clean California Act, Buy Clean Colorado Act, New York Buy Clean Concrete	Requires EPDs and phases in global warming potential limits for certain products	Cement, steel
Strengthened State Air Pollution Regulation	Texas, Louisiana, California, Colorado	State-specific rules requiring pollutant monitoring or stricter emissions limits than federal standards	Refining, chemicals

State-specific examples

— State-Led Policies for Heavy Industry

Driving Innovation:
Financial Support

Unlocks industrial innovation by derisking emerging technologies and catalyzing private investment

Stimulating Demand:
Policies to Drive Low-Emission Markets

Builds demand for low-emissions products and technologies through reducing investment risk and technological learning

Enabling Action:
Streamlined Regulations and Standards

Helps remove barriers and clarify standards to accelerate development

Data, Monitoring, Compliance, and Stakeholder Engagement:
Foundations for Effective State Low-Emission Industry Policy

Driving Innovation: Financial Support



Refining



Chemicals



Iron & Steel



Cement

Tax Credits

State tax incentives



State tax credits to augment federal support



RD&D

Targeted state support for low TRL technologies



State support for pilot and demonstration projects



Increased State Agency Support



Driving Innovation: Financial Support

- **State tax incentives** can close the cost gap between clean and traditional industrial products and technologies.
 - Mechanisms: property, payroll or income tax credits; investment tax credits; accelerated tax depreciation schedules; tax equity partnerships
- **State tax credits** can supplement existing federal tax credit programs.
 - Mechanisms: technology-specific or -neutral credits
- **Increased state agency support** can play a facilitating role in connecting facilities with technical assistance and government programs and in communicating state priorities through planning.
 - Mechanisms: technical assistance, financial matchmaking, tax credit accessibility assistance, state decarbonization roadmaps

Driving Innovation: Financial Support

- **Lower-TRL technologies** require additional R&D before advancing to demonstration and commercialization stages.
 - Example: Arizona State University's clean manufacturing innovation institute
- **State support for pilot and demonstration projects** accelerates higher-TRL technologies, unlocking benefits from learning curves and enabling market readiness.
 - Example: Federal Department of Energy Industrial Demonstration Projects, North Dakota's Clean Sustainable Energy Fund

TRL refers to Technology Readiness Level, a standardized scale to assess a technology's market maturity.

Stimulating Demand: Policies to Drive Low-Emission Markets



Refining



Chemicals



Iron & Steel



Cement

Product
Certification,
Labeling, and
Verification

Environmental Product Declarations



Demand and
Procurement
Levers

State contracts for difference



State preferential bidding for low-carbon industrial products



State material embodied emissions standards



Long-term procurement commitments



Stimulating Demand: Policies to Drive Low-Emission Markets

- **Environmental Product Declarations (EPDs)** increase transparency and enable preferential procurement of low-carbon products
- States are large purchasers of industrial products and can catalyze investment in low-carbon materials through **preferential bidding** and **material standards**.
- **Long-term procurement commitments** – such as advanced market commitments, clean buyers groups, and multi-state procurement – create demand over time.
- **Contracts for difference** are tools that provide price stability by covering the gap between the market price and cost premium of low-carbon alternatives.

Example: Environmental Product Declaration

GENERAL INFORMATION

This cradle to gate Environmental Product Declaration covers two cement products produced at the Leeds Cement Plant. The Life Cycle Assessment (LCA) was prepared in conformity with ISO 21930, ISO 14025, ISO 14040, and ISO 14044. This EPD is intended for business-to-business (B-to-B) audiences.

Heidelberg Materials

Leeds Cement Plant and Terminal
8401 Second Avenue
Leeds, AL 35094



PROGRAM OPERATOR

National Ready Mixed Concrete Association
900 Spring Street
Silver Spring, MD 20910
<https://www.nrmca.org/>

NRMCA EPD #: 20070

DATE OF ISSUE

November 11, 2022 (valid for 5 years until November 11, 2027)

Environmental Impacts

Leeds Plant: Product-Specific Type III EPD

Declared Cement Products (four):

Type II; Type I-II

Declared Unit: One metric tonne of cement

	Cement Products	
	Type II	Type I-II
Global Warming Potential (kg CO ₂ -eq)	867	920
Ozone Depletion Potential (kg CFC-11-eq)	2.76E-05	2.88E-05
Eutrophication Potential (kg N-eq)	0.94	0.98
Acidification Potential (kg SO ₂ -eq)	2.60	2.74
Photochemical Ozone Creation Potential (kg O ₃ -eq)	60.4	63.9
Abiotic Depletion, nonfossil (kg Sb-eq)	1.6-E-04	1.65E-04
Abiotic Depletion, fossil (MJ)	676	710
Product Components:		
Clinker	84%	93%
Limestone, Gypsum and Others	16%	7%

Additional detail and impacts are reported on page 5

Heidelberg Materials. (2022). *Environmental Product Declaration for Cement*. Available at: https://www.nrmca.org/wp-content/uploads/2022/11/LEEDS_CementPlantEPD_Final2022-11-09.pdf.

Enabling Action: Streamlined Regulations and Standards



Refining



Chemicals



Iron & Steel



Cement

State Siting and Permitting Reforms



Construction and Materials Standards

Performance-based standards for low-carbon industrial products



Environmental Regulations

Strengthened state air pollution regulations



Extended producer responsibility for industrial products



Enabling Action: Streamlined Regulations and Standards

- **Accelerated permitting and centralized siting processes** reduce delays and uncertainty for low-emission industrial projects.
 - Mechanisms: Establish a comprehensive state review of siting and permitting challenges, one-stop state permitting offices, energy corridors and industrial development districts, community benefits and engagement.
 - Example: Massachusetts Commission on Energy Infrastructure Siting and Permitting,
- **Strengthened state air pollution regulations** can also ensure conventional air pollutants are reduced.
 - Mechanisms: Where authority is available, state implementation plans, direct emissions standards, permitting, and rulemaking. Where authority is not available, legislation, regulatory updates, or collaboration with the EPA.

Enabling Action: Streamlined Regulations and Standards

- **Performance-based standards** focus on defining material performance requirements without prescribing exactly how products are made.
 - Mechanism: Performance-based requirements such as strength, durability, and corrosion resistance
- **Extended Producer Responsibility (EPRs)** hold producers accountable for the entire life cycle of their products, including end-of-life disposal.
 - Example: Commonly used for electronic waste, requiring producers to collect deposits and ensure toxic materials do not end up in landfills

— Data, Monitoring, Compliance, and Stakeholder Engagement

- Data is foundational for effective policy. **Clear metrics and reporting** build trust and guide decision-making.
- **Embedding compliance** mechanisms into permitting and financial support strengthen policy credibility and effectiveness.
- **Engaging a broad group of stakeholders** is vital for designing and implementing policies that build consensus, surface operational realities, and address community considerations.

Conclusions

— Conclusion

- U.S. industry is both a foundational pillar of state economies and a leading source of air pollution, accounting for nearly a quarter of national greenhouse gas emissions and substantial criteria air pollutants.
- **Low-emission industry can provide many benefits to states including emission reduction, job creation, technology innovation, and long-term economic competitiveness.**
- States can **combine financial incentives, demand policies, and regulatory standards** to advance economic and environmental benefits.
- **Data, monitoring, compliance, and stakeholder engagement** are cross-cutting measures for the design and implementation of all state-level policies.
- States **can tailor policies** to industrial subsectors, political context, and administrative capacity for maximum impact.



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Thank you

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