

State Best Practices Guide

for Decarbonizing the Industrial Sector

December 2022

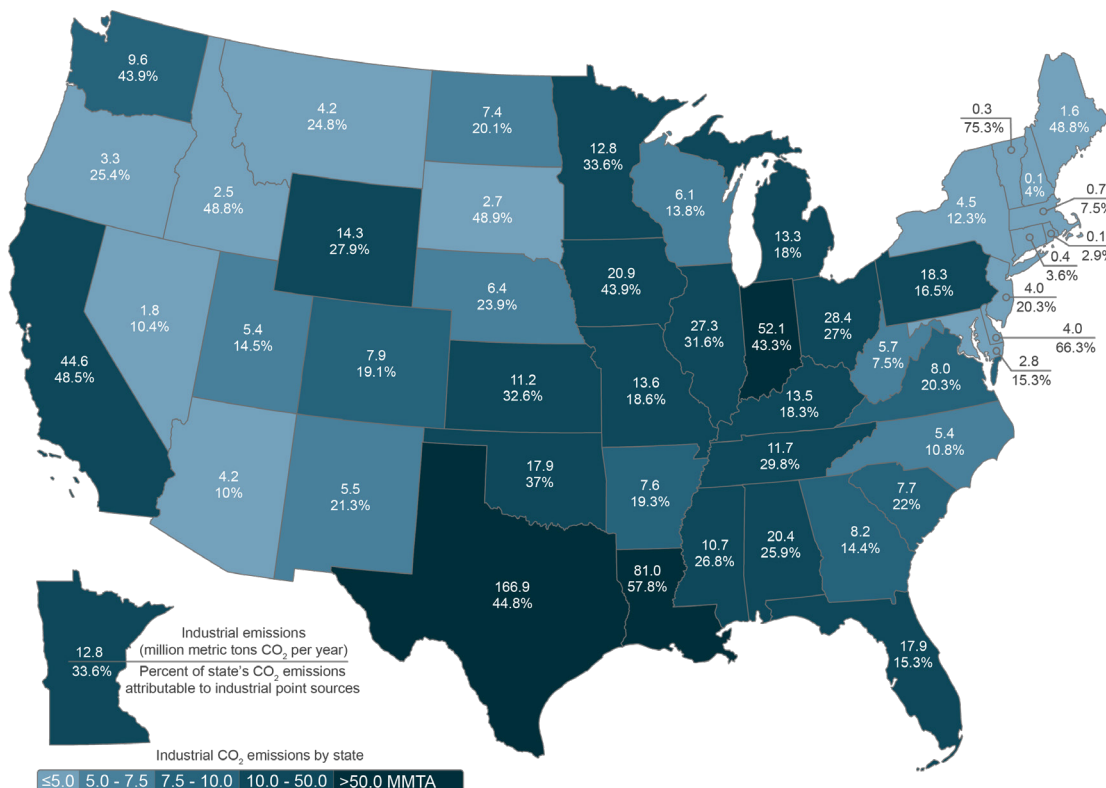


Industrial Innovation Initiative

States will play a critical role in reducing US industrial emissions. Supported by the recent influx of federal funding, states can create a regulatory and policy landscape that spurs local implementation, drives private investments, and complements federal incentives.

Industrial decarbonization is a challenge that will only be overcome should states support a full suite of policy solutions. The challenge is multifaceted. Facilities in different sectors and regions have unique needs when decarbonizing. Figure 1 shows the relative proportion of US industrial emissions on a state-by-state basis.

Figure 1. Industrial Emissions by State as a Percentage of Total State Emissions



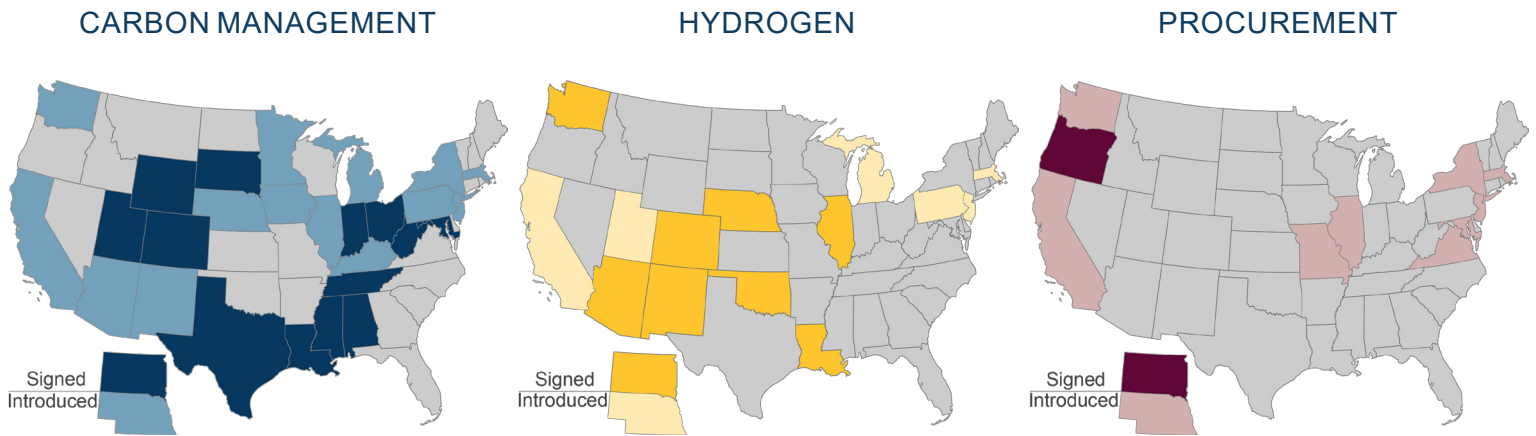
While there is no one-size-fits-all solution, carbon management, clean hydrogen, low-carbon procurement, electrification, and efficiency policies cut across industrial sectors and can be mixed and matched to greatly reduce a state's industrial emissions. Regardless of the state's available resources or emissions profile, cross-cutting statewide planning and workforce development will also be critical considerations for equitable decarbonization.

Note: Each state in the US has a unique emissions profile. While some states may have a larger share of emissions from the industrial sector, every state will need to consider these emissions when planning for statewide decarbonization.

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Figure 2. 2022 Legislation in States by Key Topic Areas



Source: Great Plains Institute analysis based on data from Industrial Innovation Initiative, July 2022 [Legislative Digest](#) (December 2022).

Note: Over the course of 2022 legislative sessions, states made progress in three key policy areas critical to advancing industrial decarbonization: carbon management, hydrogen, and procurement. While electrification and efficiency, statewide planning, and workforce development policies are more difficult to track, they are no less important to the overall progress that has been made to advance industrial decarbonization on a state-by-state basis.

The approaches described in this guide outline state policy options and current best practices that can help scale up industrial decarbonization solutions and positively affect local communities throughout the value chain. From retrofits to fuel switching, industrial decarbonization will have far-reaching upstream and downstream impacts on local jobs, health, and economies.

How to Use This Guide

The following fact sheets provide a starting point for decision makers and advocates seeking to develop an industrial decarbonization policy framework. Each state must tailor its policies to best suit the unique assets and needs of its region; however, many lessons may be learned from looking to states which have already passed decarbonization legislation.

This publication pairs high-level policy considerations with examples to demonstrate the kinds of policy language and regulatory structures in use or under consideration across the United States. The topics covered herein are not in order of priority nor exhaustive but should be viewed as a menu of options from which a state may mix and match to suit its needs.

Industrial Innovation Initiative (I³) staff developed this resource with input from I³ participants. I³ is an ambitious coalition that aims to drive emissions reductions through policy change, supporting quality jobs and investment in key US industrial sectors. Co-convened by the Great Plains Institute and World Resources Institute, I³ builds on years of stakeholder engagement and work with state officials in the Midcontinent region, as well as extensive work advancing decarbonization solutions important to the industrial sector. For more information, visit industrialinnovation.org.

State Planning



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While all the solutions proposed in this document have applications that cut across industrial sectors, some approaches cut across solution sets themselves. These big-picture approaches create cohesion and work as a part of the state's larger decarbonization strategy. Supporting emerging technologies and cooperation among industrial sectors can help build markets for low-carbon industrial products and technologies while considering specific place-based needs.

Community engagement

Investments in industrial decarbonization are also an opportunity to develop and implement projects in a way that prioritizes the health, safety, and economic activity of surrounding communities.

- Engage with communities at the very beginning of a project and continue timely and frequent communication around project development.
- Solicit, consider, and respond to input from the public and affected stakeholders (e.g., impacted communities, environmental justice groups, Native nations, and labor unions, among others).
- Provide education around community safety and right to know at the local level, and supply funding and guidance for emergency response procedures and equipment.
- Align with the federal government's Justice40 Initiative to ensure 40 percent of federal investments in climate and clean energy flow to disadvantaged communities.



The [Justice40 Initiative](#), established by the Biden Administration through **Executive Order 14008**, aligns the federal government in ensuring that 40 percent of the overall benefits of certain federal investments flow to disadvantaged communities.

Regulatory policies and planning

Establishing a task force or developing an action plan on industrial decarbonization can allow states to maximize synergies, particularly where benefits to local communities are most needed in planning clean energy infrastructure.

- Include participation across state and local officials and representatives of relevant community organizations; industrial, energy, and technology companies; environmental groups; and labor unions in task forces.
- Produce task force policy recommendations for state agencies on the opportunities, challenges, resources, and impacts associated with industrial decarbonization and develop a public outreach strategy to inform and solicit input from local communities.
- Increase staffing at the relevant state agencies to support program administration and planning.



Colorado, Massachusetts, and Maine have industry-specific greenhouse gas targets. **California** has a specific greenhouse gas emissions intensity target for a 40 percent reduction in the cement sector below 2019 levels by 2035, and net zero by 2045. **Louisiana, Washington, Wisconsin, and Michigan** have industry-specific decarbonization pathways in their climate or clean energy plans.

State Planning

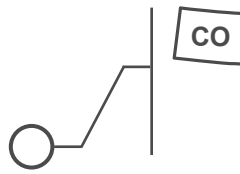


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Financing mechanisms

Dedicated programs and funding to support industrial emissions reductions at facilities can allow companies to remain flexible in their chosen emissions reduction pathway.

- Utilize statewide green banks with carveouts for the industrial sector to accelerate the commercialization of clean energy technologies.
- Create grant programs for private entities, local governments, and public-private partnerships to pursue voluntary projects that reduce greenhouse gas emissions and criteria air pollutants from industrial and manufacturing operations.



Enacted [SB 22-193](#), establishing a grant program through which the Colorado Energy Office awards grants for voluntary projects that reduce air pollutants from industrial and manufacturing operations.



Labor & Workforce Development

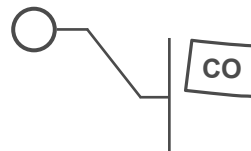


Investments in industrial decarbonization must be done in a way that benefits workers and prioritizes local communities. The recommendations in this section borrow generously from BlueGreen Alliance’s [State-Based Policies to Build a Cleaner, Safer, More Equitable Economy](#), which provides a more expansive review and set of definitions for state wage, labor, and workforce best practices.

Regulatory policies and planning

States can craft policies that ensure industrial decarbonization goes hand in hand with the growth of good union jobs. In setting industrial decarbonization priorities, states can rely on various policy tools to grow the clean economy’s high-road workforce.

- Adopt project labor agreements (PLAs), which are collective bargaining agreements covering all craft workers on a construction project. When a state government plans a project, it can make PLAs a condition of being awarded a contract, requiring the contractor to sign the negotiated PLA with the relevant union organizations before being hired.



Enacted [SB 19-236](#), directing the Public Utilities Commission to evaluate new energy utility construction proposals based on project employment metrics.

- Negotiate community workforce agreements (CWAs), which often include community organizations and reflect broader community interests.



In addition to the collective bargaining aspects of a PLA, CWAs frequently include local hire provisions, targeted hire of low-income or disadvantaged workers, and the creation of pre-apprenticeship pathways for careers on the project.

- Use local hire provisions to mandate or incentivize the hiring of workers on a project from within the state or community where the project takes place.
- Utilize targeted hire provisions of state law or community workforce/community benefit agreements for a project to mandate or incentivize the hiring of workers from certain communities (e.g., Native nations, economically disadvantaged communities, and communities impacted by climate change, among others.)



Enacted [SB 5116](#), establishing a 100 percent sales tax exemption for renewable energy projects if the project is developed under a community workforce agreement or project labor agreement.

- Rebalance the power dynamic between workers trying to organize a union and their employer with organizing rights provisions and negative determination. Negative determination disincentivizes hiring contractors who have previously violated labor, wage, or other regulations.

Labor & Workforce Development

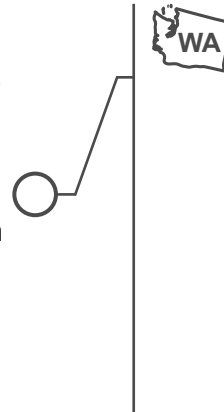


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Financial mechanisms

Incentives or requirements for contractors to pay prevailing wage on a project can be coupled with worker benefits requirements to attract high-road contractors, ensure long-term economic benefits to a community, and create a level playing field for contractors.

- Establish a prevailing wage for public works projects, which sets a wage floor for each occupation that all contractors on a project must pay at or above. This policy is limited to workers employed in the construction industry.
- Create worker benefits requirements that set a minimum standard for health, retirement, and other benefits that must be given to workers on a project.

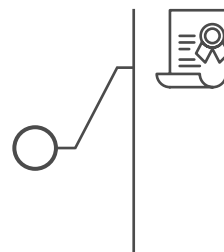


Enacted [SB 5116](#), establishing a 75 percent sales tax exemption for renewable energy projects compensating workers at prevailing wage rates determined by local collective bargaining as determined by the department of labor and industries.

Training programs

Workforce training needs will vary based on the types of industrial facilities present in a state, making state governments effective implementors of and funders for such programs.

- Develop partnerships with universities, colleges, and training programs that focus on industrial electrification, energy efficiency, and low-carbon technologies.
- Identify and engage transitioning, affected, and disadvantaged communities, targeting programs with the potential for high workforce development.
- Partner with Industrial Assessment Centers to conduct energy audits at facilities.
- Utilize union apprenticeships and pre-apprenticeship programs as key avenues for training workers. Apprenticeship utilization standards require a certain percentage of a project's workforce to be enrolled in or have graduated from an apprenticeship program and typically favor union contractors.



The **Inflation Reduction Act of 2022** provides \$200 million in grants through 2031 for states to develop and implement energy efficiency workforce training.



Carbon Management

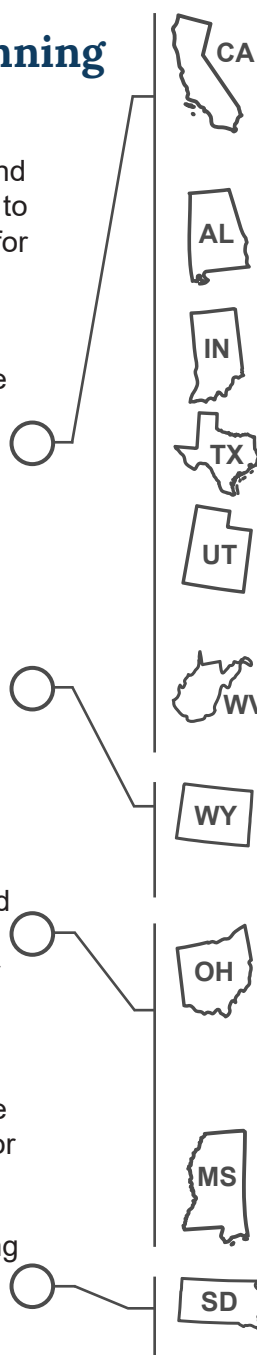


State policies play a critical role in helping individual carbon capture, transport, utilization, and geologic storage projects achieve feasibility. Carbon management is a key solution for eliminating process emissions from heavy industry. As states consider carbon management projects, they should also consider opportunities to support the buildout of regional hubs. The policy approaches outlined below help a state provide investment certainty, enable cost reductions, and spur deployment for projects. For more detailed recommendations, see the Industrial Innovation Initiative’s [Carbon Management Policy Approaches and Best Practices](#).

Regulatory policies and planning

Clarify rules and regulations around carbon dioxide (CO₂) capture, transportation, and storage, including agency responsibilities and CO₂ ownership. Such policies are essential to providing regulatory and financial certainty for project development.

- Clarify existing or establish new authorities and mechanisms responsible for regulating operations and ensuring the performance of duties relating to carbon management technologies and underground storage of carbon oxides, including monitoring, reporting, and verification.
- Clarify ownership of and responsibility for the injected CO₂ and pore space, including the percentage of landowners who need to agree to a project before it can proceed.
- Determine the capacity to administer a carbon storage program responsibly and whether to apply for Class VI primacy or maintain EPA regulatory oversight for geologic storage injection wells.
- Facilitate a predictable and timely permitting process for CO₂ infrastructure while providing clear safety standards for CO₂ capture, transport, and storage.
- Consider interstate and regional planning for CO₂ transportation and storage infrastructure.



Enacted [SB 905](#), establishing a carbon capture, removal, utilization, and storage program to evaluate the efficacy, safety, and viability of carbon management and carbon dioxide removal technologies and facilitate their implementation.

Enacted [SB 36](#), establishing the underground storage of carbon oxides (as well as ammonia and hydrogen) as in the public interest of the state.

Enacted [HB 1209](#), providing the mechanism for underground storage of CO₂ in the state.

Enacted [HB 1284](#), relating to the regulation of injection and geologic storage of CO₂.

Enacted [HB 244](#), authorizing regulations for geologic storage of carbon, and describing rules for oversight and jurisdiction over class VI injection wells.

Enacted [HB 4491](#), establishing requirements for CO₂ sequestration regulations for permitting, injection well drilling, and project completion, after which the state assumes liability.

Enacted [SF 47](#), clarifying ownership of CO₂ injected into geologic sequestration sites, specifically the transfer of title and liability of injected CO₂.

Enacted [HB 175](#), requiring the Ohio Department of Natural Resources to initiate the US Environmental Protection Agency (EPA) statewide Underground Injection Control (UIC) program for Class VI wells to obtain state primacy over those wells in the state.

Enacted [HB 1218](#), declaring CO₂ a valuable commodity and geologic storage in the interest of the state and establishing intent to seek primacy from the EPA for Class VI UIC wells.

Enacted [HB 1120](#), including carbon capture companies in pipeline taxation for any pipelines crossing counties of the state.

Carbon Management

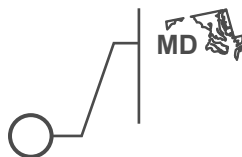


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Financial incentives

Tailor existing financial incentives to support carbon management.

- Develop a capital fund to facilitate tax equity markets and create commercial tax credits or direct payments for qualified decarbonization projects.
- Expand eligibility for clean product programs to include processes that capture carbon.
- Optimize state tax policies and expand eligibility for state financing programs.

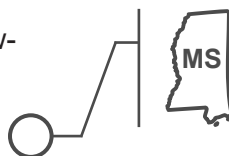


Enacted [SB 528](#) to develop plans, adopt regulations, and implement programs that reduce statewide greenhouse gas emissions.

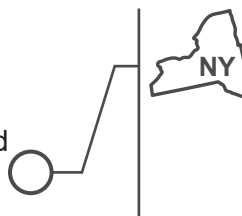
Market development

Build and support markets for captured CO₂ and low-carbon products.

- Support the designation of CO₂ as a valuable commodity.
- Establish a procurement program for products made with captured CO₂ or provide off-take agreements for low-carbon products.
- Establish a carbon removal credit program to aid in commercializing the carbon market through direct carbon removal credit procurement.



Enacted [HB 1218](#), declaring CO₂ as a valuable commodity, geologic storage in the interest of the state, and intent to seek primacy from EPA for Class VI UIC wells.



Introduced [S8 171](#) to enact the carbon dioxide removal leadership act, directing the state to procure carbon dioxide removal services in order to achieve statewide net-zero greenhouse gas emissions adherent to legally enforceable limits.



Clean Hydrogen

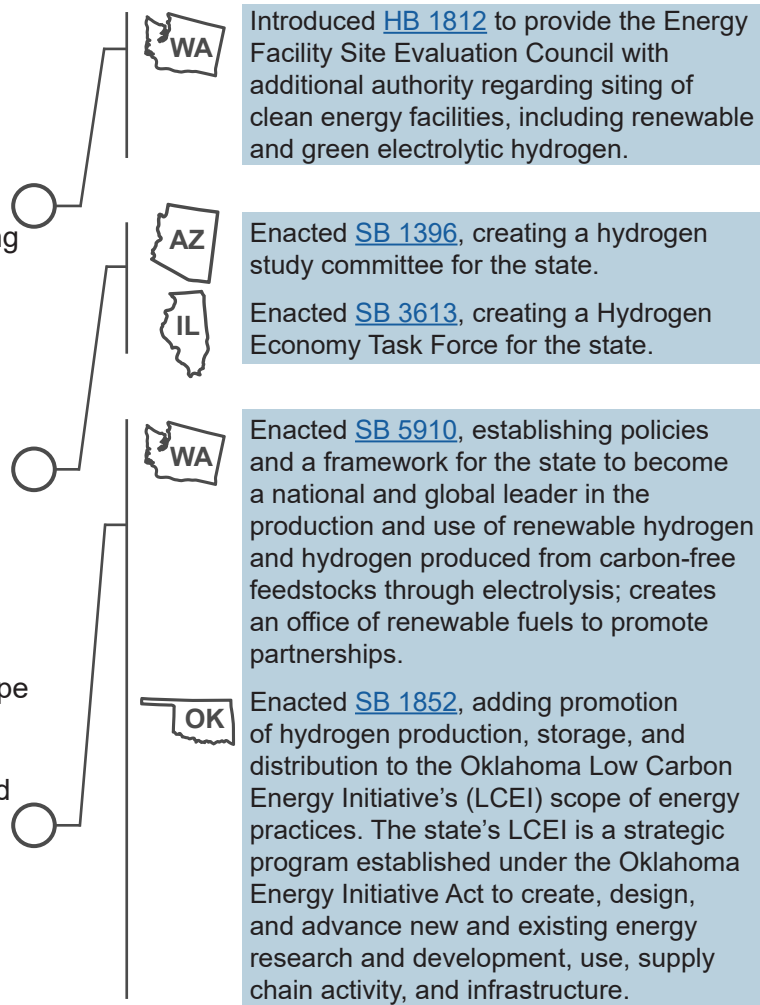


Hydrogen holds great promise as a low- and zero-carbon fuel and chemical feedstock. It can be flexibly produced given available energy resources, and when burned generates high-temperature heat that industrial processes require. Deploying clean hydrogen technologies can also utilize existing workforces and infrastructure and create new jobs. State policies are needed to reduce the cost of producing low- and zero-carbon hydrogen, spur deployment of new transport and distribution infrastructure, and develop the consumer market—in tandem with private sector investment.

Regulatory policies and planning

Prioritize hydrogen by explicitly including low- and zero-carbon hydrogen considerations within state sustainability plans and by granting state regulatory commissions the authority to include hydrogen in resource plans.

- Facilitate a predictable and timely permitting process for hydrogen infrastructure while providing clear safety standards for hydrogen production, transport, and storage.
- Create a hydrogen task force or study committee to evaluate the local ability to produce hydrogen from various fuel sources, develop the necessary transportation and storage infrastructure, and secure off-takers from diverse industry end uses, informing state targets.
- Create or expand state government offices to include clean hydrogen production, transport, storage, and related safety standards in their scope and authority.
- Engage in public disclosure and education around risks, safety, and emergency response measures for hydrogen transportation and storage.



Clean Hydrogen



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Financial incentives

Offer financial incentives for low- and zero-carbon hydrogen production and use them to complement federal incentives. Such incentives can also encourage project development within a state.

- Expand state clean fuels or low-carbon fuels tax credits to include clean hydrogen production, transport, and storage.
- Provide incentives and financial assistance in the deployment of hydrogen fuel infrastructure.



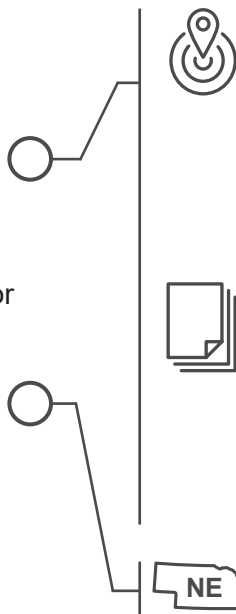
Enacted [HB 1988](#), providing tax deferral for clean alternative fuels production projects.

Enacted [SB 5910](#), establishing policies and a framework for the state to become a national and global leader in the production and use of renewable hydrogen and hydrogen produced from carbon-free feedstocks through electrolysis; creates an office of renewable fuels to promote partnerships.

Regional hydrogen networks

Scale hydrogen through establishing, supporting, or connecting with regional clean hydrogen hubs projects throughout the value chain.

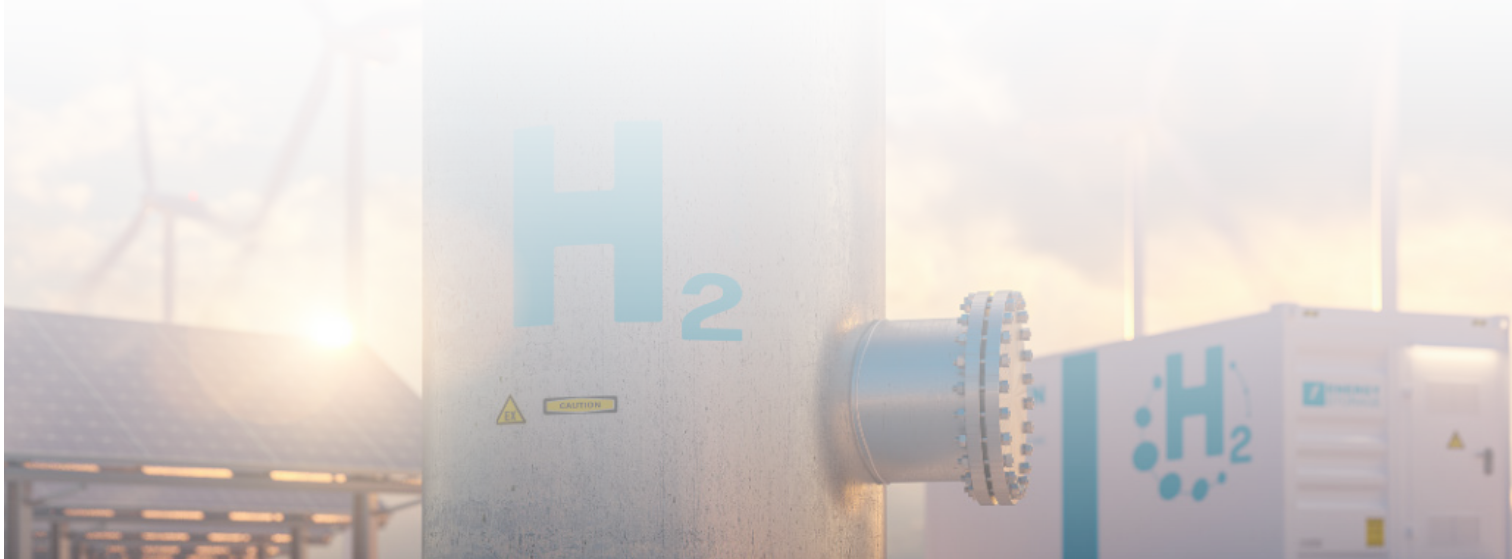
- Create a hydrogen working group tasked with developing a hydrogen hub proposal for federal funding or the means to connect to existing or proposed hydrogen hubs in the state's region. Such efforts should consider local resources and relevant economic sectors.



Supportive federal and state policy is critical to scale up the technologies and associated infrastructure necessary to bring carbon and hydrogen solutions to scale. **The Bipartisan Infrastructure Law of 2021** established the [Regional Clean Hydrogen Hubs Program](#), including up to \$7 billion to establish six to ten regional hubs across the US.

In February 2022, the **Great Plains Institute** released [An Atlas of Carbon and Hydrogen Hubs for United States Decarbonization](#), identifying 14 hubs across eight regions of the US that offer the capacity to help expand and accelerate emissions reductions and carbon removal through focused coordination, deployment, and policy.

Enacted [LB 1099](#), creating a hydrogen hub industry working group.



Low-Carbon Procurement



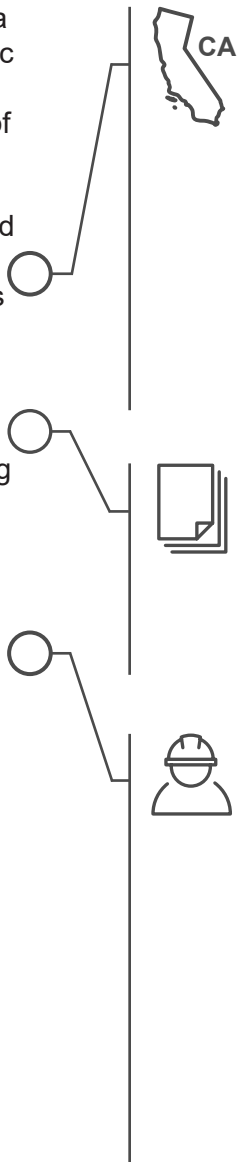
State procurement policies provide an opportunity for governments to lead by example. They are a critical lever to create a low-carbon product market and ensure reliable demand. This approach will help increase the deployment of new market-ready, low-carbon technologies through incentives or requirements for the public sector market. These policies will be particularly effective for construction materials sectors, such as cement and steel, where state governments are one of the largest purchasers.

For more on state-based low-carbon procurement policies, see **Carbon Leadership Forum's** ["Map of Embodied Carbon Policy in the US."](#)

Regulatory policies and planning

Setting procurement standards and creating a required carbon intensity benchmark for public sector purchasing can help provide market certainty while lowering the carbon intensity of the built environment.

- Set benchmarks that are regularly updated in order to continually increase the stringency of embodied carbon reductions and support innovation.
- Require departments of transportation to use a set percentage of low-carbon concrete, asphalt, steel, and other building materials in transportation infrastructure projects.
- Develop a task force to harmonize efforts with federal procurement standards, working across the General Services Administration, US Department of Transportation, and other states.
- Extend state contracts and procurement guidance resources to local and Native governments to participate in environmentally preferred purchasing agreements.



California's [Buy Clean California Act](#) (BCCA) ([Public Contract Code Sections 3500-3505](#)) was enacted in 2017 and was the first example of Buy Clean legislation in the United States. BCCA requires the state to establish and publish "maximum acceptable Global Warming Potential (GWP) limits" for select construction materials, which were finalized in January 2022. Starting in July 2022, all covered materials used in public construction projects must prove they meet the GWP limits by submitting EPDs that disclose the carbon intensity of manufacturing a specific material.



[Natural Resources Defense Council's Design Guide to State and Local Low-Carbon Concrete Procurement](#) provides an overview of approaches to leverage public sector purchasing as a tool to reduce emissions from concrete being implemented, adapted, or advocated for in the US.



The **Pacific Coast Collaborative** announced the launch of the [Low Carbon Construction Task Force](#) at COP26, an effort between the states of California, Oregon, Washington, the province of British Columbia and the cities of Vancouver (British Columbia), Seattle, Portland, San Francisco, Oakland, and Los Angeles to advance low-carbon materials and methods in building and construction projects. The task force will create a shared regional strategy with the goal of accelerating innovation, investment, and market development for low-carbon materials by leveraging the scale of the Pacific Coast regional economy.

Low-Carbon Procurement



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Financial incentives

Financial support through states can help bring the cost of low embodied carbon materials to parity with traditional building materials, supporting early innovators and building the market for low-carbon products.

- Establish procurement bonus policies that provide a cost discount to a company's bid if it has lower carbon intensity than its competitors.
- Create a fund that covers the cost differential (if any exists) between low-carbon bids and bids that use conventional technologies.
- Develop funding mechanisms such as grants to support RDD&D to produce low-carbon building materials.
- Pilot projects with university campuses and test databases to collect information and produce progress reports.

Information and disclosure policies

Environmental product declarations (EPDs) and other reporting mechanisms or disclosure policies allow for product comparisons and are critical to setting meaningful emissions intensity benchmarks.

- Set EPD requirements and establish grant programs to assist bidders and proposers in the preparation of EPDs.
- Establish technical advisory committees or otherwise provide technical assistance to advise state departments in charge of procurement (such as the department of transportation).
- Provide technical and financial assistance for manufacturers who face a financial barrier to completing EPDs or similar reporting mechanisms due to their significant cost.
- Support disclosure around fair labor standards, including compensation, working hours, and collective bargaining.



Minnesota's [amendment to HF 278](#) commissioned an environmental impacts study to explore the feasibility of Buy Clean-like legislation for the State of Minnesota.



Washington performed a [Buy Clean Washington Study](#) by the Carbon Leadership Foundation and published in 2019.



Enacted [HB 4139](#), requiring the Oregon Department of Transportation (ODOT) to reduce greenhouse gases associated with concrete, asphalt, and steel products used on DOT projects by 2025. Requires EPDs, establishes a grant program to assist bidders and proposers in preparing EPDs, and establishes a technical advisory committee to advise ODOT.



Enacted [HB 21-1303](#), also known as "Buy Clean Colorado," in 2021, which directs the Office of the State Architect and the Colorado Department of Transportation each to establish policies regarding the GWP for specific categories of eligible materials used to construct certain public projects.



Washington considered a pair of bills ([HB 1103](#) and [SB 5659](#)) in 2022 for Buy Clean Buy Fair policy development in the state. While neither bill passed, they are an example of statutory language establishing climate and labor standards for building materials used in state public works projects. The state also commissioned a [Buy Clean Buy Fair Pilot Study](#), requiring environmental and labor data to be submitted for state construction projects, and a case study analysis. The final report is due November 2022.



Electrification & Efficiency

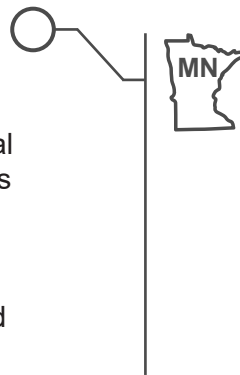


Many industrial processes—particularly those that use low- and medium-temperature heat—can be electrified to reduce their direct emissions without impacting the final product. Electrification simultaneously future-proofs industrial production and the associated high-wage jobs. It is essential to pursue energy efficiency improvements in parallel with electrification to help offset expected increases in overall electricity demand. Efficiency measures also have additional co-benefits. For example, efficiency measures can reduce overall operating expenses, which can, in turn, lower the cost hurdle for other decarbonization solutions.

Regulatory policies and planning

States should engage utilities and customers alike when doing energy system planning. At the facility level, exchanging existing equipment for electro-technologies may trigger permitting or other authorization procedures. Streamlining these processes can help avoid needlessly stalling the electrification process.

- Work with utilities and their regulators to facilitate pathways for industrial electrification, including a venue for communication between utilities and industrial customers to identify needs and facilitate collaboration.
- Allow innovation and flexibility in the resource planning process for utilities to explore alternative, lower carbon solutions to meet demand.
- Conduct a study to assess the potential change in electrical load from industrial electrification and the grid modifications (e.g., demand response measures) needed to ensure reliability.
- Clarify the authority to develop holistic energy systems and regional transmission plans to enhance grid flexibility and reliability.

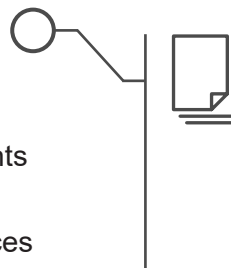


Statute encourages natural gas utilities to develop innovative resources under chapter 216B. See section [216b.2427](#) natural gas utility innovation plans and section [216b.2428](#) lifecycle greenhouse gas emissions accounting framework; cost-benefit test for innovative resources.

Material Efficiency

Innovative processes, novel mixes or feedstocks, and the use of recycled materials in the production process can increase material efficiency, allowing for less waste and fewer carbon emissions throughout each lifecycle stage.

- Include data on material use in lifecycle impact assessments for information and disclosure policies.
- Set material efficiency benchmarks to promote best practices and inform public procurement standards.
- Establish policy incentives for reuse and recycling of high-emission primary materials, such as steel.



The **International Energy Agency (IEA)** report, [Material Efficiency in Clean Energy Transition](#), details the potential for material efficiency in industry, providing analysis and policy recommendations to reduce emissions.

Electrification & Efficiency



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Financial incentives

Provide financial assistance to help transition facilities to high efficiency and electric technologies.

- Offer tax credits or grants for emerging electrification and efficiency technologies that require support for broader commercialization and deployment.
- Provide incentives and technical assistance to accelerate the replacement of large capital investments in process heat (such as boilers and large service heat pumps) and undergo energy efficiency upgrades at the point of equipment turnover.
- Offer financial assistance to cover the cost of energy audits and the potential improvements recommended by the audits.



Utah's [Industrial Energy Challenge](#) is a voluntary program that encourages new and ongoing investment in energy efficiency by Utah manufacturing and industrial companies. The challenge involves peer-to-peer networking workshops and technical training, followed by public recognition of leading industrial firms.



[Colorado](#) passed a regulation for **Greenhouse Gas Emissions and Energy Management for Manufacturers (GEMM)**, requiring facilities to show through an audit process they are using greenhouse gas best available control technologies and energy best management practices to achieve an additional 5 percent reduction in their greenhouse gas emissions. [HB 1266](#), passed in July 2021, requires Colorado's manufacturing sector as a whole to reduce their emissions by 20 percent by 2030, based on 2015 reported emissions, which will be addressed in a second phase of the GEMM rulemaking in 2022 and 2023.



New York State's Energy Research and Development Authority (NYSERDA) designed a [C&I Carbon Challenge](#) to help companies and organizations implement their best energy-saving/carbon-reduction projects through a competitive proposal process. Challenge winners will work one-on-one with a dedicated NYSERDA resource on all their proposed projects rather than navigating multiple different NYSERDA or utility initiatives.



Massachusetts' [Mass Save Program](#) offers energy efficiency incentives, rebates, and programs for businesses to incorporate energy savings into new and existing facilities.

