

Building To Net-Zero:

A U.S. Policy Blueprint for
Gigaton-Scale CO₂ Transport
and Storage Infrastructure

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AMERICA'S UNIONS

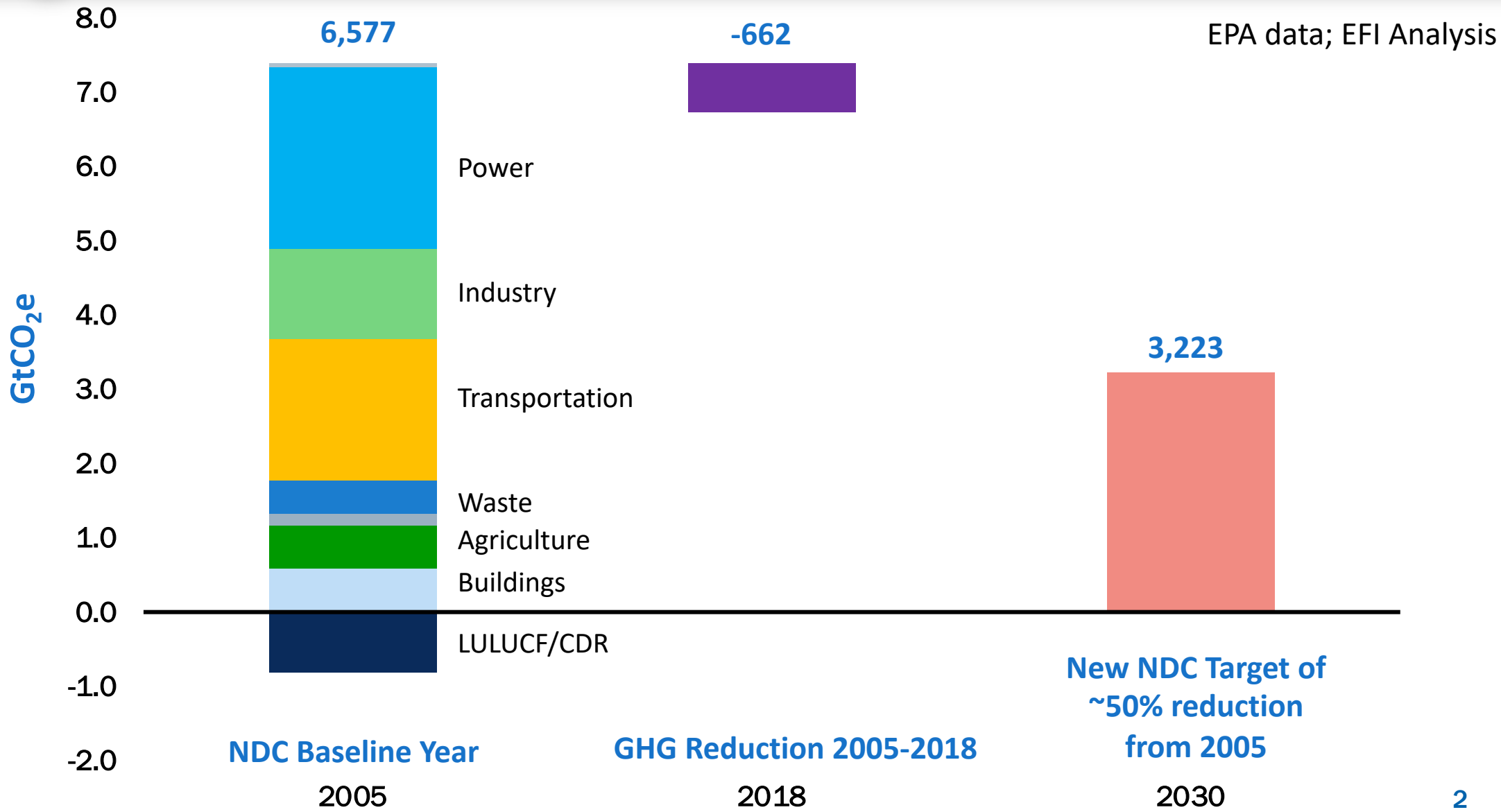


**ENERGY FUTURES
INITIATIVE**





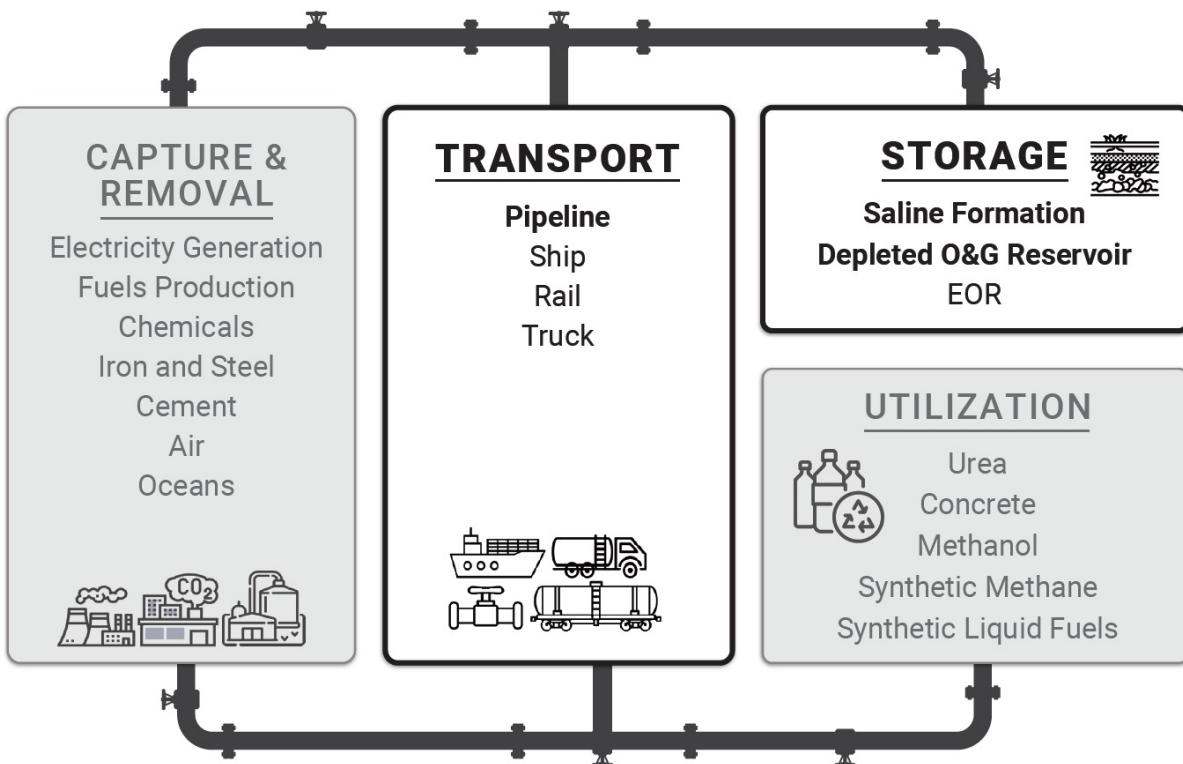
Meeting the NDC target will take rapid, economywide decarbonization



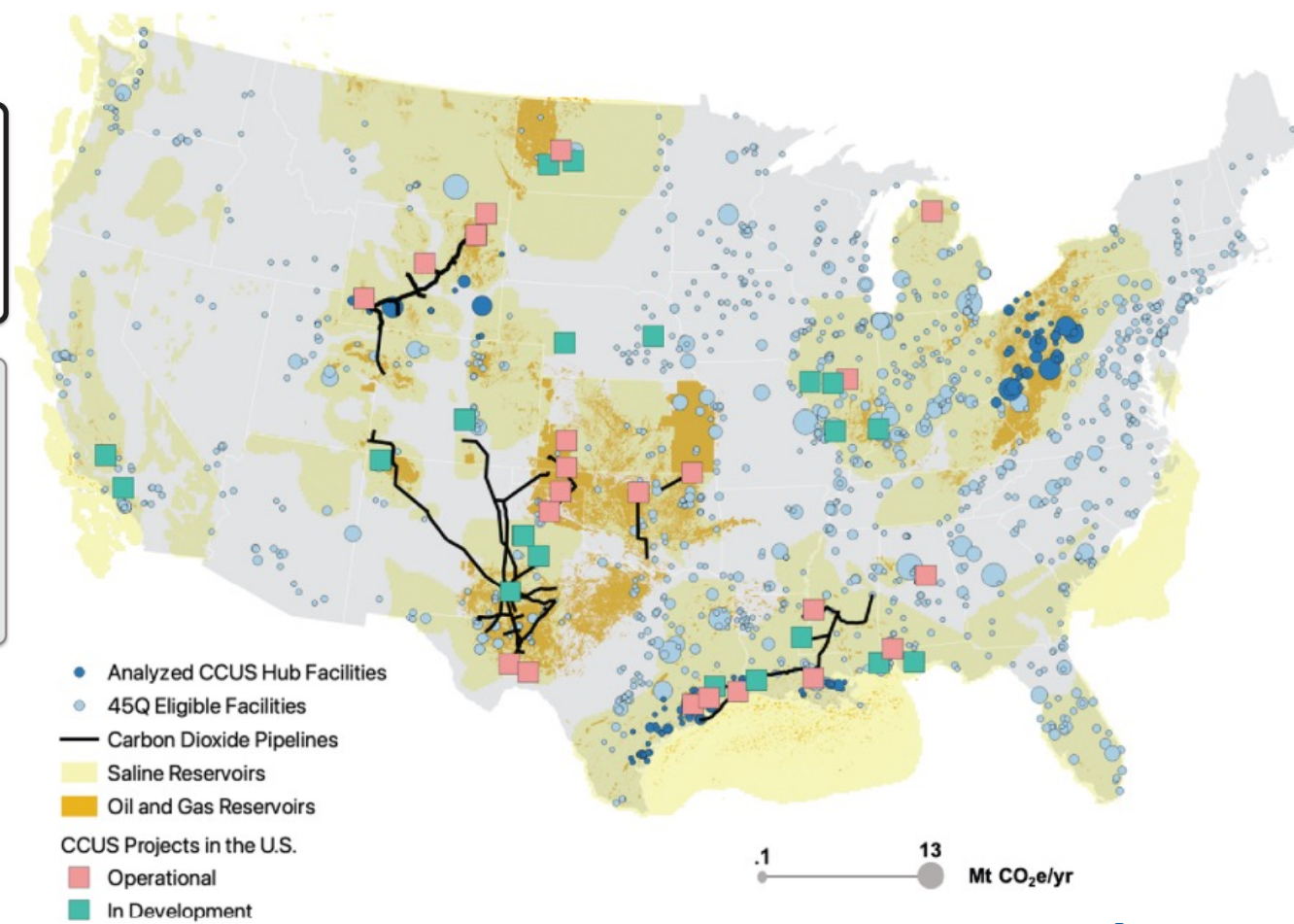


Creating a new focus on building the enabling CO₂ infrastructure

Overview of CO₂ Infrastructure



Major Existing U.S. CO₂ Facilities





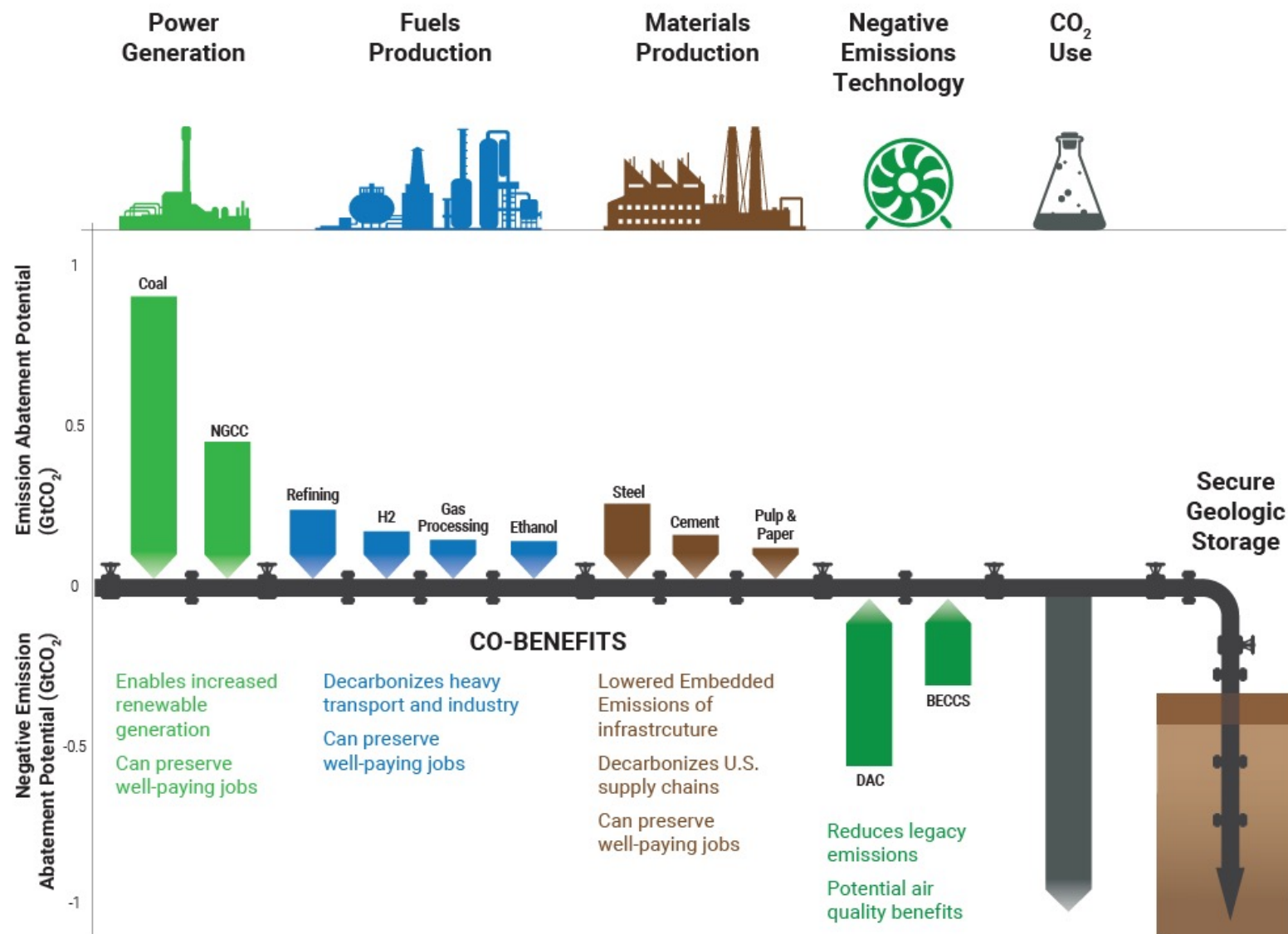
Unlocking a gigaton of emissions reductions and removal economywide

Support near-term, economywide emissions reduction and removal of CO₂ from the atmosphere.

Preserve jobs in hard-to-decarbonize sectors that underpin the nation's clean industrial development.

Create new industries and additional good-paying jobs for U.S. workers, often relying on the skillsets common to existing emissions-intensive industries.

Decarbonize **supply chains** for manufacturing, fuels, and power generation





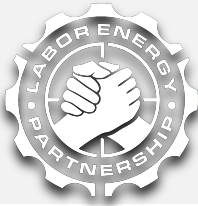
CO₂ hubs support multiple sectors and clean energy pathways

CO₂ hub development is key to moving the industry up the CCUS learning curve, capturing economies of scale for CO₂ sources, and supporting other clean energy systems

Our report includes more than a **dozen policy recommendations** supporting CO₂ infrastructure hub development, with an emphasis on labor and equity issues

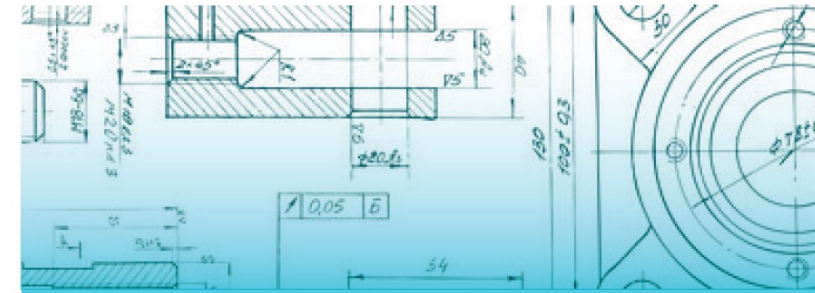
Our modeling analysis shows that **building CO₂ infrastructure hubs could unlock significant CO₂ capture potential** across many subsectors in Industry and Electricity





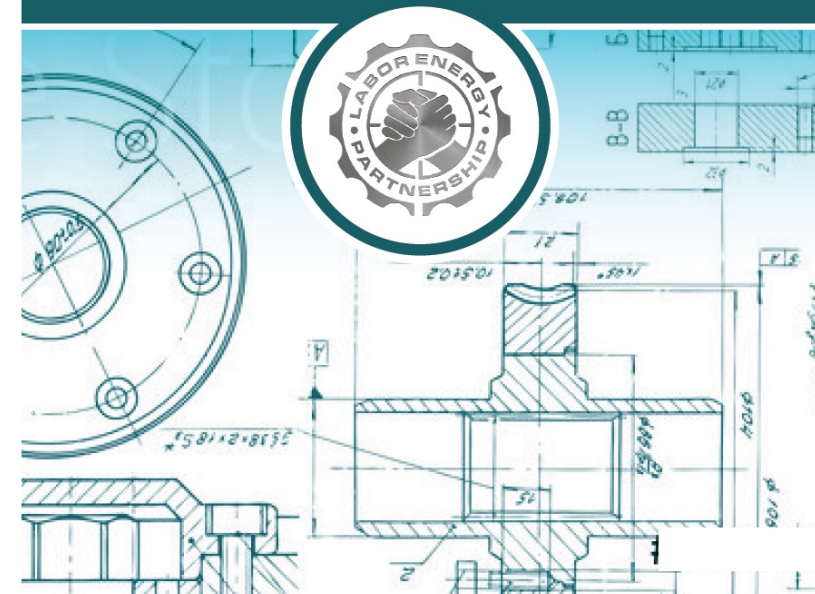
About *Building to Net-Zero*

- Collaborate with union partners to understand **labor impacts** of policies
- Conduct **regional case studies** for CCS hubs in the Ohio River Valley, the **Gulf Coast**, and **Wyoming**
- Identify **opportunities** and **challenges** of deploying CO₂ infrastructure
- Make **policy recommendations** to the Legislative and Executive Branches



Building to Net-Zero

A U.S. POLICY BLUEPRINT FOR GIGATON-SCALE
CO₂ TRANSPORT AND STORAGE INFRASTRUCTURE





Testimonials from Labor Unions Included in Blueprint



“Passage of the **SCALE Act** is very important because that will begin the process of developing the infrastructure to get carbon to the places where it will be injected in the ground.”



“[Policymakers should] increase funding for the development of the technology as well as to **increase the funding for the demonstration projects** that were included in the Energy Act that was passed last year—that bill called for six demonstration projects, two industrial, two gas, and two coal, but no money was appropriated for these projects.”



“In our view, CCUS technologies can help **preserve good jobs and create new ones**. And those technologies can do so while reducing carbon emissions from essential industries that ensure U.S. economic health and global competitiveness.”



“[Expanding 45Q tax credits] is only a small piece of the puzzle. What is needed is a **rapid development and deployment of the infrastructure** that will be needed to [move CO₂ and] deploy CCUS.”



“Already, our **Canadian Boilermakers have built CCUS facilities** at Shell Quest in Edmonton, Alberta, SaskPower’s Boundary Dam in Estevan, Saskatchewan, and the NWR Sturgeon Refinery - part of the Alberta Carbon Trunk Line.”



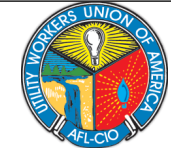
“CCUS will be key for **maintaining good manufacturing jobs** as the global economy decarbonizes. It will be particularly important for industries like steel, cement, chemicals, and refining where United Steelworker members work.”



“The Boilermakers are encouraged by the interest and support that many U.S. lawmakers have shown in this critical technology, including the expansion of tax incentives for CCUS projects. **We hope to see that momentum continue** with additional CCUS-focused legislation and increased funding for the Department of Energy’s CCUS research and development.”



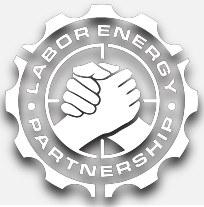
“Policymakers will need to ensure that our nation builds out the infrastructure and incentives to reduce the costs and ensure widespread deployment of carbon capture technology.”



“CCUS holds potential for **energy, environmental and economic benefits**. Deploying the technology at scale can protect and create high-paying jobs in energy production and other heavy industries while allowing us to meet our mid-century goals for mitigating carbon emissions across the economy.”

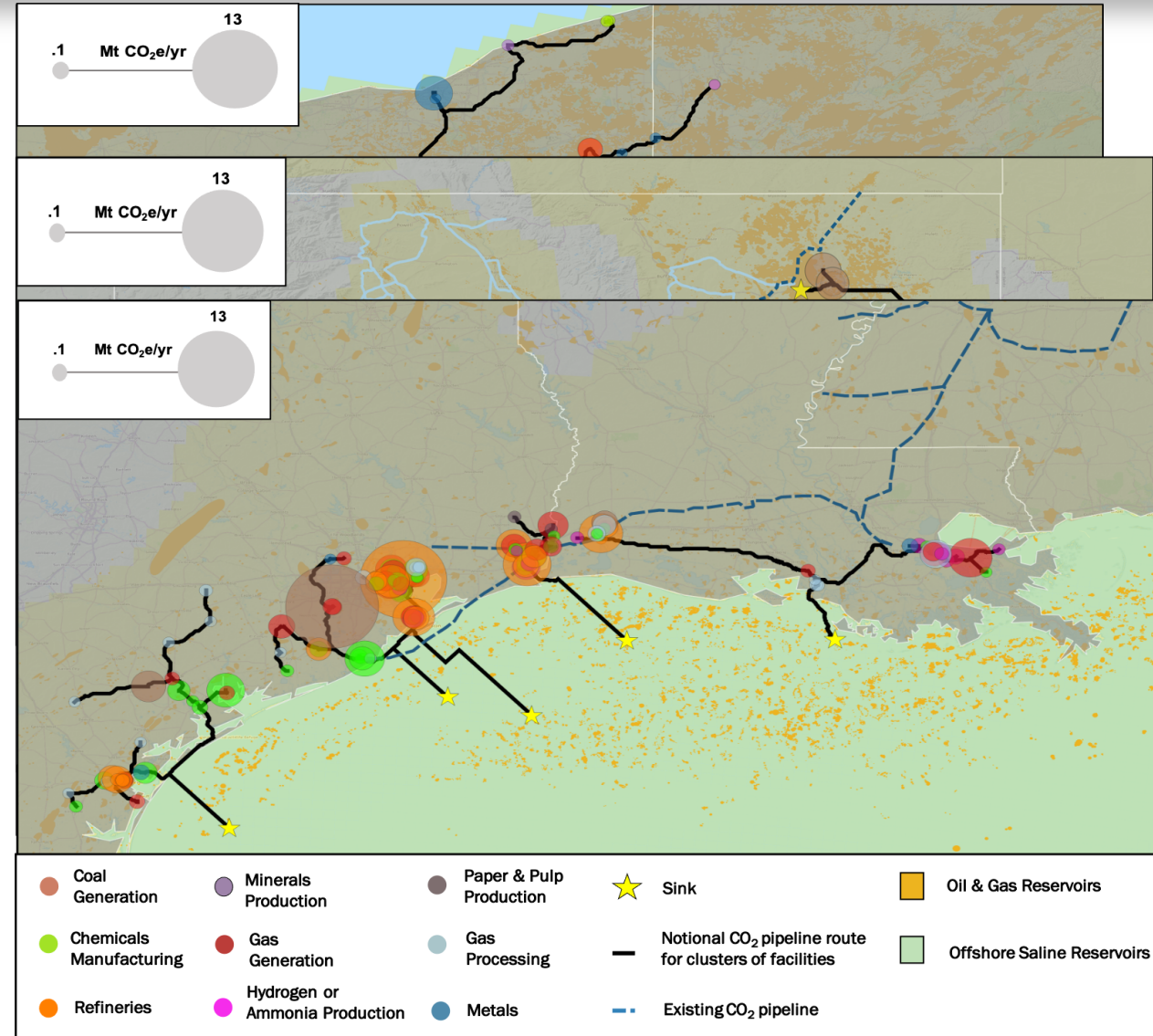


“As a craft that constructs and repairs electric power plants, refineries, pulp and paper mills, and steel mills, **we see enormous opportunities for our members** with widespread adoption of CCUS.”



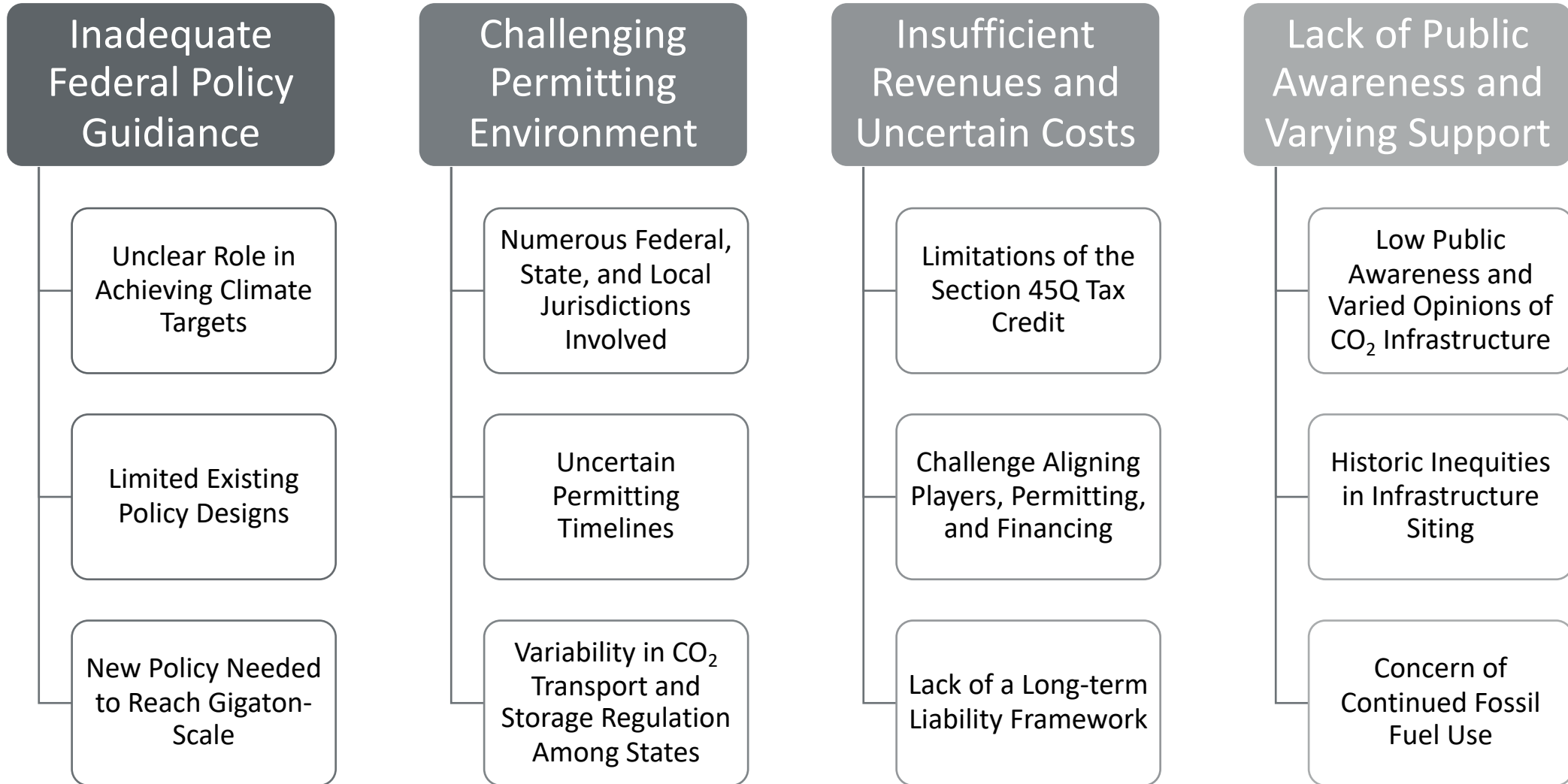
Case Studies of Potential CO₂ Hubs in the United States

Region	Total Emissions Reduction	Hub Facilities
Ohio River Valley	123 MtCO ₂	<p><u>Sources</u>: 29 power generation, 19 iron and steel/aluminum, 5 chemicals manufacturing & production, 2 refinery, and 1 mineral plant</p> <p><u>Sink</u>: 8 geologic storage sites, 855 miles of CO₂ pipelines</p>
Wyoming	43 MtCO ₂	<p><u>Sources</u>: 10 power generation, 4 refinery, 2 chemicals manufacturing and production, and 1 mineral plant</p> <p><u>Sink</u>: 4 geologic storage sites, 443 miles of CO₂ pipelines</p>
Texas and Louisiana Gulf Coast	171 MtCO ₂	<p><u>Sources</u>: 47 chemicals manufacturing and production, 31 power generation, 25 refinery, 23 gas processing, 21 hydrogen and ammonia production, 3 iron and steel/aluminum production, and 2 paper and pulp production plants</p> <p><u>Sinks</u>: 5 geologic storage sites, 1,462 miles of CO₂ pipelines</p>





Challenges for Gigaton-Scale CO₂ Infrastructure

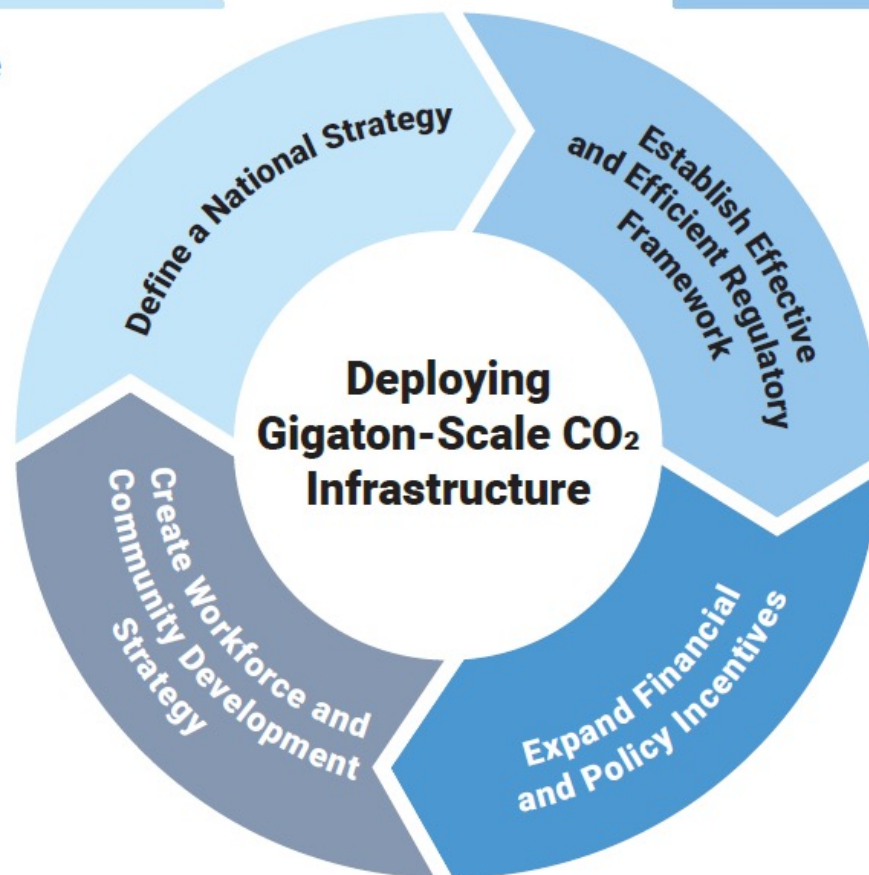




Policy Blueprint for Gigaton-Scale CO₂ Infrastructure Development

- Achieve gigaton scale CO₂ infrastructure by 2050
- Establish national target for carbon dioxide removal for 2030 and 2050
- Prioritize regional CO₂ hubs serving multiple users
- Enable scalable CO₂ storage business models

- Create opportunities to transition conventional fossil energy jobs to CO₂ management jobs
- Extend economic development funding to communities building CO₂ hubs
- Conduct public education and outreach to address environmental justice concerns of frontline communities

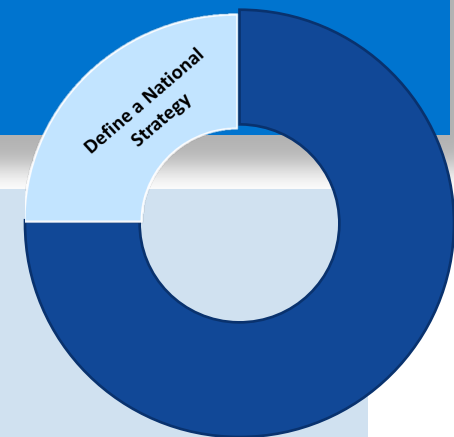


- Enhance federal capabilities to coordinate regulation and permitting of CO₂ infrastructure projects
- Strengthen implementation of UIC Class VI permitting process
- Establish an effective regulatory framework for siting interstate CO₂ pipelines

- Extend and expand provisions for tax credits for CO₂ capture and storage
- Expand federal funding for CO₂ storage and pipeline infrastructures
- Expand RFS eligibility for CCUS projects
- Establish a Federal scheme for managing long-term liability risk of stored CO₂



Define a National Strategy



- **Set a national target for implementing one Gt per year of CO₂ infrastructure capacity**
- Direct agencies to promote clean U.S. supply chains
- **With Congress, support scalable business models for CO₂ storage**
- Set a national CDR target (separate and distinct from NDC)



- Target funding for CO₂ infrastructure to offer equitable transitions for workers and communities
- Require federal agencies to designate CO₂ transport infrastructure corridors on federal lands
- Encourage deploying high-capacity CO₂ infrastructure for hub formation



- Coordinate the planning and development of hydrogen and CO₂ infrastructures



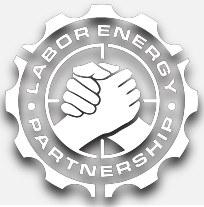
- With BLM, offer long-term leases for geologic storage of CO₂ on federal lands (BLM)
- With BOEM, provide a comprehensive regulatory framework for sub-seabed CO₂ storage in the Outer Continental Shelf



Possible Ownership and Management Structures for CO2 Storage Business Models

MODEL TYPE	OWNERSHIP	OPERATION	FINANCING	LIABILITY	PERMITTING	SITING	ANALOGS
PRIVATE SECTOR MODEL	Private	Private	Private with government subsidy	Private	Works with Governments	Works with Governments	Current CCUS Projects (e.g., ADM*, Petra Nova)
UTILITY MODEL	Government chartered, Private	Private	Private with government subsidy, Government regulated	Private, Government insurance model, Obligation to serve	Works with governments	Works with governments	Investor-owned interstate utilities in electricity, gas, telecoms, etc.
PUBLIC AUTHORITY MODEL	State/local government, Interstate compact	Private, Government	Government, Private partners	Government, Obligation to serve	Eminent domain authority, Works with governments	Eminent domain authority, Works with governments	Public utilities for electricity, etc.; interstate or intermunicipal agencies (e.g., DC WASA*, Port Authority); federal quasi-corporations (e.g., Amtrak, USPS)
QUASI-FEDERAL GOVERNMENT MODEL	Federal Government	Government, Contractors	Government, Private partners	Government, Regional or national jurisdiction	Eminent domain authority, Works with governments	Eminent domain authority, Works with governments	TVA, Power Marketing Administrations (e.g., BPA, WAPA, SWPA*)

*ADM=ARCHER DANIELS MIDLAND; DC WASA = DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY; TVA = TENNESSEE VALEY AUTHORITY; BPA = BONNEVILLE POWER ADMINISTRATION; WAPA = WESTERN AREA POWER ADMINISTRATION; SWPA = SOUTHWESTERN POWER ADMINISTRATION



Establish an Effective and Efficient Regulatory Framework



- **Create a Clean Energy Permitting Facilitation Office (CEPFO) to assist with timely and efficient CO₂ infrastructure permitting**
- Convene an Interagency Working Group to develop an action plan for CO₂ hubs
- Explore and support the use of existing rights-of-way
- Explore and support the use of existing infrastructure for CO₂ pipelines



- **Implement a government-wide assessment and solicit improvements for CO₂ infrastructure regulations (CEQ)**



- Increase the funding to EPA for permitting Class VI storage wells



- Engage technical experts to inform its Class VI injection permitting review process
- Seek Congressional appropriations to increase the funding for permitting Class VI storage wells



Enhance Policy Support and Strengthen Financial Incentives



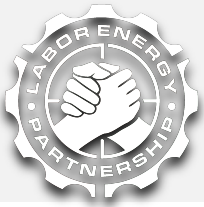
- **With the Treasury Department, develop a federal liability framework for CO₂ storage**
- Seek Congressional appropriations of \$4 billion for cost-shared infrastructure investments over the next five years
- Consider the local benefits when evaluating grants for regional demonstration projects



- Increase funding to the Carbon Storage Program to develop sites for commercial-scale storage
- Appropriate \$4 billion for cost-shared infrastructure investments over the next five years
- Modify the 45Q tax credit
- Reinstate and expand the 48C tax credit
- Update the Section 48A Advanced Coal tax credit



- Allow CCUS as a lifecycle GHG emission reduction technology pathway in the Renewable Fuel Standard (RFS)



Create Workforce and Community Development Strategy



- Expand apprenticeship and pre-apprenticeship programs that train skills relevant to CO₂ transport and storage



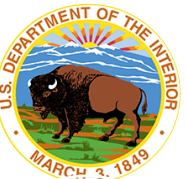
- **With USDA and DOT, engage communities with displaced energy workers**
- Direct project developers to allocate a portion of funds for community engagement
- **Expand and standardize local outreach programs**



- Fund the Dislocated Worker Grant program and prioritize grants that translate skills
- Require projects receiving tax credits to pay prevailing wages consistent with Davis-Bacon



- Direct project developers to allocate a portion of funds for community engagement
- **Expand and standardize local outreach programs**
- Increase funding requests for existing EJ programs
- Improve EJScreen



- Extend abandoned mine reclamation funding to support economic development communities that are developing CO₂ transport and storage hubs



- Provide Economic Development Administration Assistance to Coal Communities program to fund infrastructure projects, brownfields redevelopment, and technical assistance and financing for non-infrastructure projects with an "economic development" focus