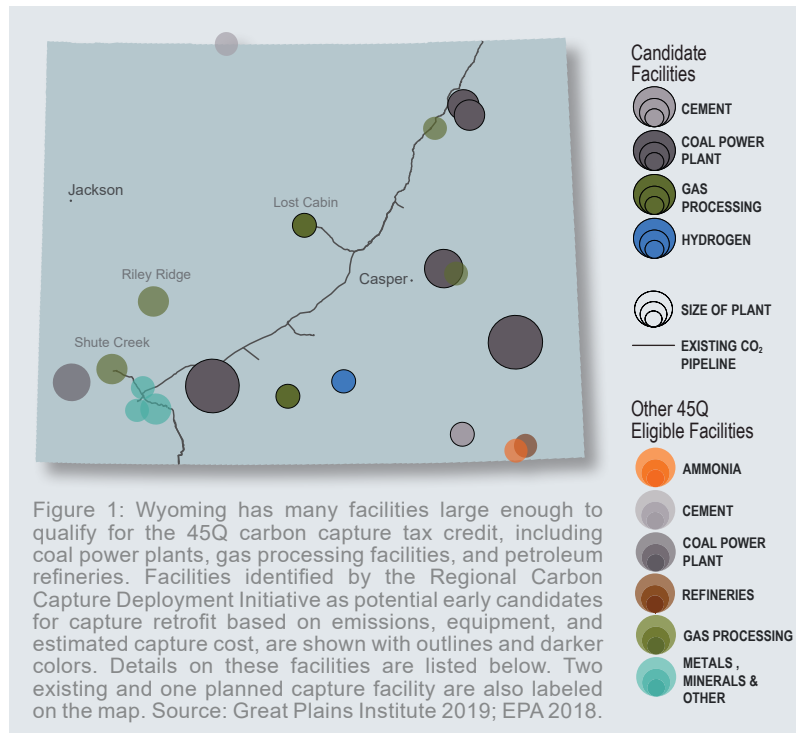


# Wyoming

## IMPLEMENTING CARBON CAPTURE AND STORAGE TECHNOLOGY

Wyoming is one of the largest emerging hubs for CO<sub>2</sub> pipeline infrastructure and projects, serving not just Wyoming, but linking to Colorado and Montana. As such, Wyoming is strategically positioned to become both a major source of CO<sub>2</sub> captured from industrial facilities and power plants, as well as a hub for the beneficial use and geologic storage of captured carbon. Ranked first among states in the production of coal and eighth in crude oil production, while also containing 23 facilities eligible for the newly reformed and expanded federal 45Q tax credit, Wyoming has immense opportunity for the deployment of carbon capture technology and enhanced oil recovery (EOR) to lower carbon emissions and transform captured carbon into an economic resource. As one of the first states to enact legislation on carbon capture utilization and storage, Wyoming now has among the most comprehensive carbon capture incentives and legislation in the nation. Uniquely among states, Wyoming also developed a pipeline corridor initiative to facilitate the development of statewide and regional infrastructure for the transport and management of CO<sub>2</sub>. With a supportive tax structure, comprehensive legislation and geologic potential, Wyoming is projected to continue as a leader in carbon capture policy development and project deployment.

### SOURCES BY INDUSTRY & VOLUME



### POTENTIAL CANDIDATE FACILITIES FOR CAPTURE WITH ANNUAL EMISSIONS

Facility Name	Location	Industry	Total Facility CO <sub>2</sub> Emissions thousand tons	CO <sub>2</sub> Captured Target thousand tons	Theoretical Capture Cost \$/ton (Draft - Do Not Cite)
Jim Bridger	Point Of Rocks	Coal Power Plant	11,762	1,600	\$57
Dave Johnston	Glenrock	Coal Power Plant	5,008	1,600	\$57
Dry Fork Station	Gillette	Coal Power Plant	3,283	1,600	\$57
Laramie River	Wheatland	Coal Power Plant	11,203	3,200	\$54
Wyodak	Gillette	Coal Power Plant	3,067	1,600	\$57
Lost Cabin	Lost Cabin	Gas Processing	733	642	\$11
Mountain Cement	Laramie	Cement	635	574	\$56
Echo Springs Gas Plant	Wamsutter	Gas Processing	538	205	\$14
Sinclair Oil Corporation	Sinclair	Hydrogen	1,033	194	\$49

Table 1: The Regional Carbon Capture Deployment Initiative estimated theoretical facility capture costs based on published capture equipment costs, facility-specific operational patterns, existing equipment, and level of emissions. Most states have a large number of facilities eligible for 45Q. Of those facilities, the above table lists likely economically feasible candidates based on estimated capture cost. This list is not meant to be definitive. Commercial decisions by participating companies, and policy and regulatory decisions by state governments, will ultimately determine if a project is feasible for carbon capture. Captured Emissions refers to the amount of carbon dioxide that can be expected to be captured at a facility considering relevant technological and economic constraints. Source: GPI 2019; EPA 2018.

### LEGISLATIVE CONTEXT

Wyoming has a comprehensive legislative tool kit for carbon capture utilization and storage. For geologic storage of carbon, key issues such as pore space ownership, long-term management, CO<sub>2</sub> ownership and liability, unitization, and primacy as well as an established regulatory scheme are defined in statute. Permitting processes and certifications for implementing carbon capture projects are also outlined in legislation. See Table 2 for Wyoming's most prominent carbon capture policies. To ensure timely additions and updates to legislation regarding carbon capture and storage, Wyoming has

created the Enhanced Oil Recovery Commission to continue research and development of carbon capture technologies. The University of Wyoming's Enhanced Oil Recovery Institute (EORI) works within the commission to research enhanced oil and gas recovery potential in the state, with the goal of increasing state tax revenue. Through research, field demonstrations and commercial-scale implementation of EOR technology, EORI has predicted that within the next 20 years one billion additional barrels of oil will be produced using EOR technology, which would be a pathway to secure geological

## LEGISLATIVE CONTEXT CONT.

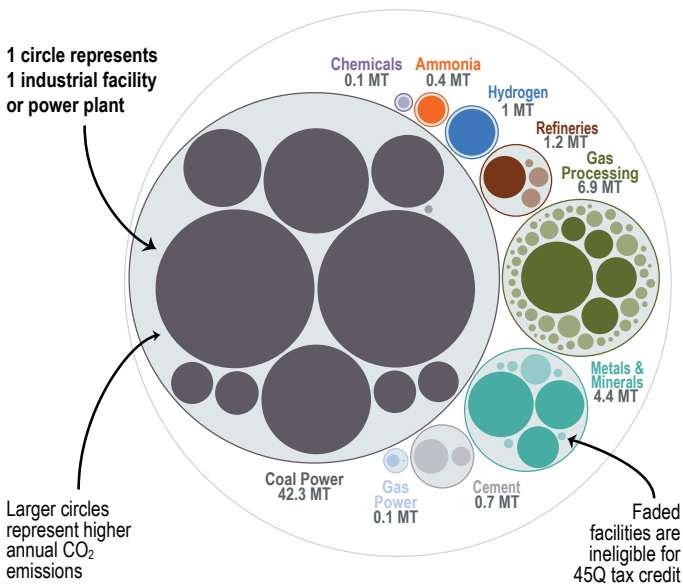
carbon storage in Wyoming. The Wyoming government has continually demonstrated strong support for carbon capture through participation in collaborative regional initiatives, state-level legislation on carbon capture and storage and support for federal legislation on carbon capture and storage. Former Governor Matt Mead co-founded multiple regional and national initiatives supporting carbon capture, including the State Carbon Capture Work Group and the Governors'

Partnership for Carbon Capture. Governor Mark Gordon has sustained this support by keeping carbon capture a major priority of his administration and continuing participation in these initiatives. In 2019, the Wyoming Coal to Carbon Products joint Senate resolution passed, expressing support for research and development of carbon products. Wyoming's legislation is a prime example for other states crafting legislation regarding carbon capture and storage.

Table 2: The following table lists Wyoming's most prominent carbon capture and storage legislative actions:

Issue	Description of Legislation
HB 17 2010: Long -Term Management through Storage Fund	Establishes the Geologic Sequestration Special Revenue Account to measure, monitor, and verify sites after closure and termination of permit. Fees are paid by permit holders of the CCS site.
HB 89 2008: Pore Space Ownership	Pore space is owned by surface owner. Pore space can be transferred as separate property.
HB 58 2009: CO <sub>2</sub> Ownership and Liability	The site operator owns and is responsible for, injected CO <sub>2</sub> until liability is transferred to the state.
HB 80 2009: Unitization (HB 249 2017)	80% of pore space owners must consent to the CCS project before unitization. Under special circumstances, this can be lowered to 75%.
HB 57 2009: Primacy	Mineral rights have primacy over CCS.
HB 90 2008: Regulatory Scheme for CO <sub>2</sub> geologic storage	Directs DEQ to regulate and issues carbon storage permits under the current UIC program.

## FACILITIES AND EMISSIONS BY INDUSTRY



MT: Million metric tons CO<sub>2</sub>

Figure 2: This bubble diagram visualizes the number of facilities and corresponding annual CO<sub>2</sub> emissions for each industry in Wyoming. The darker large bubbles are eligible for the 45Q carbon capture tax credit, while the faded bubbles are too small to be eligible. The total amount of CO<sub>2</sub> emissions in Wyoming is listed for each industry. Source: GPI 2019; EPA 2018.

The **Regional Carbon Capture Deployment Initiative** brings together state officials with diverse industry, NGO, labor, and other stakeholders to promote broad scale deployment of infrastructure for carbon capture, CO<sub>2</sub> pipelines, enhanced oil recovery (EOR), other forms of geologic storage, and beneficial utilization of CO<sub>2</sub> in the Western and Midwest regions of the country.

The Initiative is staffed by the Great Plains Institute (GPI), a nonpartisan, nonprofit working to transform the energy system to benefit the economy and environment.

For more information on this effort, go to [carboncaptureready.org](http://carboncaptureready.org) or contact Patrice Lahlum at [plahlum@gpisd.net](mailto:plahlum@gpisd.net).

## CAPTURE AND STORAGE POTENTIAL

Strategically positioned to deploy both carbon capture and storage projects, Wyoming has high potential for further commercial deployment. Based on 2016 facility data, 23 facilities in Wyoming qualify for the 45Q tax credit, ten of which are coal power plants. Wyoming's economy is strongly tied to coal production and coal fired electric generation, producing nearly 40 percent of the coal consumed in the US. Five of the ten coal power plants were identified as likely economically feasible facilities for carbon capture. Figure 1 provides a visual overview of Wyoming's likely economically feasible candidates for carbon capture projects and existing CO<sub>2</sub> pipelines.

Wyoming has favorable geology for the deployment of carbon storage projects. The Great Green River Basin in southwestern Wyoming is especially suitable, containing the Moxa Arch, one of the largest and most promising geological CO<sub>2</sub> storage sites in the Rocky Mountain region. The University of Wyoming and partners are undergoing research on storage potential at PacifiCorp's Jim Bridger Plant site within the Moxa Arch, assessing feasibility of capture and storage of over 50 million metric tons of CO<sub>2</sub>. Additional saline formations are being utilized for carbon storage, including Exxon Mobil's project storing CO<sub>2</sub> and hydrogen sulfide in the Madison Limestone formation from its Shute Creek Gas Plant in Wyoming. The state is also home to the Integrated Test Center, a research facility for the study of carbon capture, sequestration and management, as well as research on carbon as a marketable commodity. In May 2018, the US Department of Energy's Office of Fossil Energy selected the University of Wyoming's Carbon Storage Assurance Facility Enterprise project to receive roughly 12 million dollars under Phase II of the funding opportunity announcement. The project looks to determine commercial-scale geological carbon storage in Wyoming's Powder River Basin. Given Wyoming's substantial fossil energy production, extensive geologic reservoirs, existing CO<sub>2</sub> pipeline infrastructure, continuous carbon capture, utilization and storage research, and its strong legislative foundation, the state is primed to remain a leader in the deployment of carbon capture technologies.

Maps and graphics within this document are based on work by the Great Plains Institute (GPI) to help the Regional Carbon Capture Deployment Initiative identify facilities that qualify for the federal 45Q tax credit and are optimal near-term investment opportunities for carbon capture for each state. For more information, visit [carboncaptureready.org](http://carboncaptureready.org).