United States Energy Association

Global CO_2 Storage Atlas: Where Can the World Store Its Carbon?

OVERVIEW

Carbon capture and storage (CCS) hinges not only on the capacity to capture CO_2 but also on the availability of subsurface sites to store it securely over centuries. Geologically suitable formations such as saline aquifers, depleted oil & gas fields, and basalt reservoirs provide the promise, yet only a small fraction is commercially viable today. This article maps global storage potential, highlights key regions, and explores the technical, regulatory, and logistical barriers that shape CCS deployment.

GLOBAL STORAGE POTENTIAL: FROM GIGATONNES TO REALITY

A 2024 major international assessment , the CO_2 Storage Resource Catalogue (CSRC), Cycle 4, led by the Oil and Gas Climate Initiative (OGCI) in partnership with the Global CCS Institute, the International Association of Oil & Gas Producers (IOGP), and Halliburton, evaluated 1,272 potential CO_2 storage sites across 54 countries. Using the Society of Petroleum Engineers' Storage Resource Management System (SRMS) methodology, the study identified more than 14 gigatonnes of assessed CO_2 storage resources, ranging from early-stage technical estimates to sites with proven commercial readiness. While this represents only a fraction of the estimated global theoretical capacity (in the thousands of gigatonnes) the CSRC provides the most recent, standardized, and geographically comprehensive dataset available. By cataloguing resource maturity, the study helps governments and industry pinpoint priority sites, guide permitting and investment decisions, and accelerate the build-out of CO_2 transport and storage infrastructure.

However, the CSRC findings underscore that only a small fraction of identified resources are ready for near-term development, and an even smaller subset can be considered fully "commercially ready" today. For perspective, global CO_2 injection to date totals roughly 0.028 gigatonnes or what the U.S. power sector emits in less than two weeks. This gap between assessed resource and operational deployment reflects the reality that large-scale CO_2 storage requires not just favorable geology, but also the supporting infrastructure, streamlined permitting, and sustained investment to bring sites online. With one of the world's largest assessed storage bases, the United States is well positioned to lead in converting these mapped opportunities into functional assets, both domestically and through cross-border partnerships that leverage its technical expertise and project finance capacity.

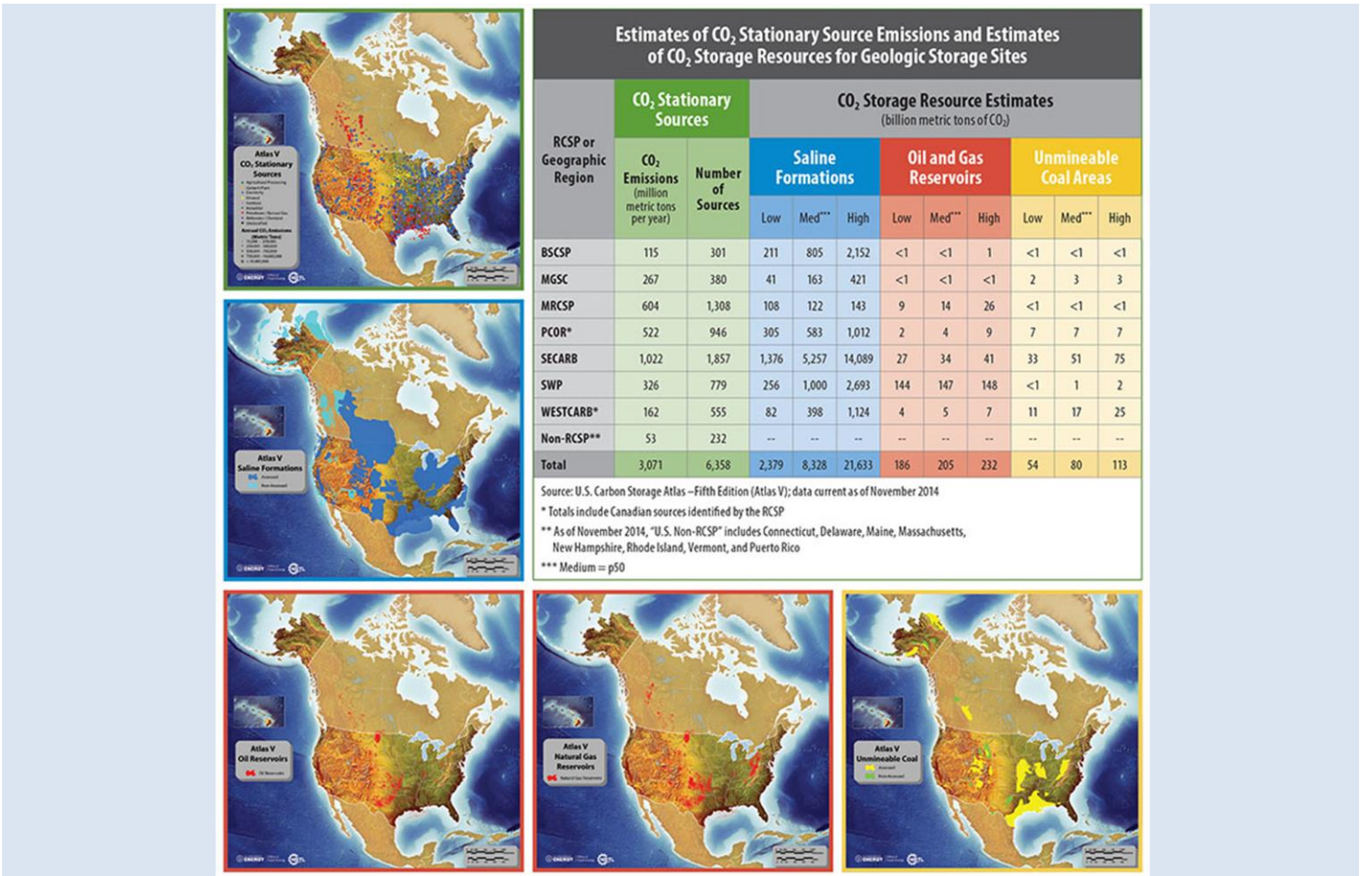
HOW ARE THE NUMBERS CALCULATED?

Global storage estimates use the Society of Petroleum Engineers' Storage Resource Management System (SRMS), adapted from oil and gas exploration. Geologists assess the volume and porosity of suitable rock formations, apply storage efficiency factors, and account for regional pressure limits to determine how much CO_2 can be safely injected and permanently stored.

STORAGE HOTSPOTS

1. NORTH AMERICA & CANADA

North America continues to lead in the largest theoretical storage capacity, supported by decades of geological surveying and field testing. As of 2025, the U.S. Department of Energy's latest Carbon Storage Atlas (Version VI) and the National Carbon Sequestration Database (NATCARB) identify over 2,000 gigatonnes of theoretical CO_2 storage capacity across saline aquifers, depleted oil and gas fields, unmineable coal seams, and basalt formations. Among the most promising regions is the U.S. Gulf Coast, especially in Texas and Louisiana, where thick Miocene-age sandstone formations offer high injectivity and proximity to industrial CO_2 sources. New UIC Class VI well permits in these states have surged since 2023, driven by expanded 45Q tax credit incentives. In Canada, the Weyburn-Midale CO_2 Project in Saskatchewan remains a world leader in secure CO_2-EOR, having stored over 42 million tonnes since 2000 using anthropogenic CO_2 from the Dakota Gasification plant in North Dakota. Canada has also expanded its CCS infrastructure, with Alberta's Carbon Trunk Line (operational since 2020 with a 14.6 Mt/yr capacity) now supporting multiple commercial storage hubs and a maturing regulatory framework.



Estimates of CO_2 Stationary Source Emissions and Estimates of CO_2 Storage Resources for Geologic Storage Sites

RCSP or Geographic Region	CO_2 Stationary Sources		CO_2 Storage Resource Estimates (billion metric tons of CO_2)								
			Saline Formations			Oil and Gas Reservoirs			Unmineable Coal Areas		
	CO_2 Emissions (million metric tons per year)	Number of Sources	Low	Med***	High	Low	Med***	High	Low	Med***	High
BSCSP	115	301	211	805	2,152	<1	<1	1	<1	<1	<1
MGSC	267	380	41	163	421	<1	<1	<1	2	3	3
MRCSP	604	1,308	108	122	143	9	14	26	<1	<1	<1
PCOR*	522	946	305	583	1,012	2	4	9	7	7	7
SECARB	1,022	1,857	1,376	5,257	14,089	27	34	41	33	51	75
SWP	326	779	256	1,000	2,693	144	147	148	<1	1	2
WESTCARB*	162	555	82	398	1,124	4	5	7	11	17	25
Non-RCSP**	53	232	--	--	--	--	--	--	--	--	--
Total	3,071	6,358	2,379	8,328	21,633	186	205	232	54	80	113

Source: U.S. Carbon Storage Atlas – Fifth Edition (Atlas V); data current as of November 2014
* Totals include Canadian sources identified by the RCSP
** As of November 2014, "U.S. Non-RCSP" includes Connecticut, Delaware, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, and Puerto Rico
*** Medium = p50

Image 1: Atlas V Estimates of CO2 Stationary Source Emissions and Estimates of CO2 Storage Resources for Geologic Storage Sites, National Energy Technology Laboratory

2. EUROPE & THE NORTH SEA

Europe's CO_2 storage potential remains concentrated in the North Sea Basin, where deep saline aquifers and depleted offshore gas fields span the territorial waters of Norway, the United Kingdom, the Netherlands, and Denmark. Norway continues to lead, with the Sleipner project surpassing 14 million tonnes of CO_2 safely stored in the Utsira Formation since 1996. Decades of seismic monitoring confirm no leakage or pressure anomalies, reinforcing the long-term reliability of saline aquifer storage. Norway's robust legal framework has enabled the launch of Northern Lights, which became operational in June 2025, receiving its first shipment of CO_2 from the Heidelberg Materials Brevik cement plant. The project (backed by Equinor, Shell, and TotalEnergies) receives CO_2 by ship from industrial emitters in Norway and, starting in late 2025, continental Europe, and injects it into a designated offshore site. Complementing these efforts, the CO_2 Highway Europe initiative is advancing a large-scale pipeline corridor to connect industrial regions in continental Europe with North Sea storage hubs, further strengthening the cross-border backbone for regional decarbonization. In the UK, the Endurance saline aquifer anchors the East Coast Cluster, with injection expected to begin by 2027. The UK has issued multiple storage licenses and invested heavily in CO_2 pipeline infrastructure linking Teesside and Humberside to offshore hubs. Europe's approach continues to emphasize cross-border coordination and repurposing of oil and gas infrastructure, positioning the North Sea as a central corridor for industrial decarbonization.

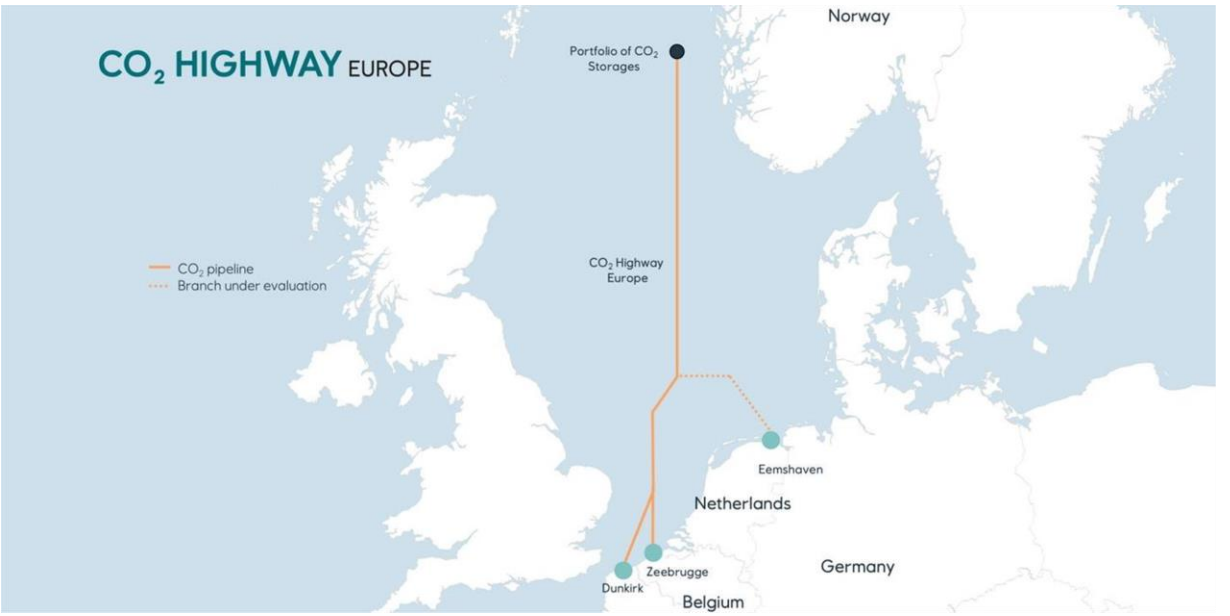


Image 2: CO_2 Highway Europe, Equinor

3. AUSTRALIA

Australia has significant CO_2 storage potential, with an estimated 31 gigatonnes of sub-commercial capacity and over 470 Gt yet to be discovered (Chevron Australia, 2024; Australian Government Geoscience data as cited by NETL, 2025). The Gorgon Project, the country's largest CCS facility, has faced major setbacks, including underperformance and high costs, injecting just 1.6 $MtCO_2$ in 2023–24, well below its design target of ~4 Mt/yr. Despite this, it remains a key demonstration of large-scale saline aquifer storage. The newer Moomba project launched in late 2024 with an initial 1.7 Mtpa capacity, while the Otway Test Centre continues to lead in monitoring and verification research through its Stage 4 program, which began in 2023.

Image 3: Chevron starts up CO2 injection and storage project at Gorgon

4. GLOBAL SOUTH

In parallel with these large-scale developments in North America, Europe, and Australia, capacity-building initiatives are gaining momentum in the Global South. On 30 July 2025, the inaugural virtual meeting of the *Network of National CCUS Centres of Excellence in the Global South* (NNCCE) was convened by the IEAGHG and the Gulf Coast Carbon Center at the University of Texas at Austin. The network, formalized after an in-person session in Regina, Canada, in October 2024, brings together leading institutions from Trinidad and Tobago, Indonesia, India, South Africa, Morocco, Colombia, and others, alongside the International Finance Corporation. Participants identified shared challenges, including: securing funding, accessing subsurface data, obtaining suitable land, and coordinating with multiple ministries. These parallel many hurdles faced in developed economies. The NNCCE aims to foster technical cooperation, knowledge exchange, and joint problem-solving, with its next meeting set to prioritize key topics and resources to accelerate CCUS readiness in emerging markets. Such initiatives are essential for scaling CO_2 storage globally, ensuring that future industrial decarbonization is not limited to well-capitalized regions.

5. ASIA

Asia's CCS deployment is at an early stage, with a few demonstration projects in operation and several large-scale initiatives under development. China operates the Qilu–Shengli project, which captures around 1 million tonnes of CO_2 per year from a petrochemical plant and uses it for enhanced oil recovery. Japan successfully completed the Tomakomai CCS Demonstration Project, injecting about 300,000 tonnes of CO_2 into offshore formations between 2016 and 2019, and has since launched government-supported "Advanced CCS Projects" to prepare for commercial-scale deployment. In Malaysia, Petronas is advancing plans for offshore storage at the Kasawari gas field, which could begin injection before the end of the decade. Indonesia is developing CCS regulations and has approved initial projects in its gas sector, while also exploring international cooperation on

CO_2 transport and storage. South Korea continues to invest in CCS research through the Korea CCS R&D Center but does not yet have a commercial-scale storage site. India has significant theoretical storage potential identified in saline aquifers and depleted oil and gas fields, but no large-scale CCS projects are currently operational.

6. BASALT MINERALIZATION

As of 2025, Iceland continues to offer a distinct CO_2 storage model through mineralization in basalt, led by the Carbfix project. Rather than injecting compressed CO_2 gas, Carbfix dissolves CO_2 in water and injects the mixture into reactive basalt formations, where it chemically bonds with calcium, magnesium, and iron to form stable carbonates—effectively turning CO_2 into rock within two years. This approach minimizes leakage risk and offers permanent storage. Since 2012, Carbfix has operated at the Hellisheiði geothermal power plant, with over 95% of injected CO_2 mineralized within 24 months. However, recent critiques have focused on the high water usage (about 25 tonnes of water per tonne of CO_2) and the geographic limitations of suitable basalt formations. While the process remains cost-competitive at roughly $25–30 per tonne, scalability concerns persist. Nonetheless, Carbfix has expanded its reach: the Coda Terminal, a CO_2 import and injection hub near Reykjavík, began construction in 2024 and aims to accept CO_2 shipments from European industries starting in 2026. The project has also launched feasibility studies with partners in Italy, Spain, and parts of the U.S. Pacific Northwest, exploring basalt-rich regions for replication of the mineralization model.

SECURING AMERICAN ENERGY AND ECONOMIC INTERESTS THROUGH STRATEGIC CO_2 STORAGE

As of 2025, carbon storage is gaining traction globally not just as a climate tool, but as a means to preserve industrial capacity and energy flexibility. The United States holds one of the largest CO_2 storage resource bases in the world. However, the gap between theoretical capacity and commercially viable sites remains significant, and challenges such as permitting delays, infrastructure bottlenecks, and long-term liability need continued attention. Other nations, including Norway and Canada, are investing heavily in integrated storage networks, positioning themselves to capture new industrial value chains. For the U.S., the key policy questions are less about endorsing CCS in principle, and more about how to ensure regulatory efficiency, infrastructure readiness, and cost competitiveness in the event that demand for secure carbon management grows, whether from global market forces, trade rules, or private sector strategy. As with pipelines, ports, and energy corridors, strategic planning now could reduce future risks and create optionality for U.S. industry later.

SOURCE LIST

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