Industrial Emissions and Fossil Fuel Use

Kansas is home to industries including ethanol production, natural gas processing, and pulp and paper manufacturing. Facilities in the Kansas hub emit 2.7 million metric tons (Mt) of CO₂e annually, including 2.1 Mt from stationary combustion and 600,000 t from process emissions. Several natural gas liquids fractionation plants and gas processing facilities in this regional hub are the focus of a hub proposed by Kansas Geological Survey (KGS) and DOE’s Carbon Utilization and Storage Partnership.

The top industrial fuels consumed in the Kansas hub include natural gas at 21 million MMBtu per year and petroleum coke at 2.8 million MMBtu per year. Gas processing plants are the largest consumers of fossil fuels in this regional hub, consuming 19 million MMBtu of fossil fuels per year.

Using hydrogen as a medium- and high-intensity energy source to displace conventional fossil fuels can reduce combustion emissions alongside other solutions like electrification and renewable energy. Process emissions from product manufacture are another major source of GHGs at industrial facilities. These production processes may not involve fuel combustion and would require other solutions such as carbon capture to fully decarbonize.
Kansas Hub

Carbon capture and storage is an essential tool for achieving midcentury climate goals, maintaining the competitiveness of US industry, and protecting and creating high-wage jobs. Carbon capture is crucial in decarbonizing key carbon-intensive industries where CO₂ emissions are inherent to the chemistry of production processes and cannot be eliminated solely by switching to low-carbon electricity. The US has capacity to safely and permanently store thousands of years of carbon emissions in geologic saline formations.

Carbon Capture and Storage

The Section 45Q tax credit lowers cost barriers to carbon capture and storage. There are two industrial facilities in the Kansas hub that meet emissions thresholds for Section 45Q eligibility. Both facilities have been identified as near- to medium-term candidates for capture retrofit over the next 10 to 15 years.

Kansas has potential to act as a major carbon storage destination for capture facilities and carbon removal. The state of Kansas has potential to store 37 billion metric tons of CO₂ in secure geologic saline formations, and also has extensive capacity for carbon storage in geologic fossil basins such as oil and gas fields. The Kansas hub is the focus of a KGS and DCE study aiming to identify potential CO₂ reservoirs for long-term geologic storage.

CO₂ storage opportunities

- Geologic storage opportunity
  - Assessed low-cost saline storage
  - Fossil CO₂ storage formation
  - Existing petroleum production site

Carbon capture opportunities

- 45Q-eligible facilities by industry
  - Ethanol
  - Near- to medium-term
  - Additional emitting facility

Fossil storage formations by CO₂ storage capacity

- Sooner Trend
- Wright
- Ringwood
- Spivey-Grabs-Basil
- Chase-Silica
- Yukon Nw
- Cheyenne Valley
- Oakdale
- Geneseo-Edwards
- Cushing

Saline storage formations by CO₂ storage capacity

- Arbuckle
- Anadarko Basin
- Canyon
- Cherokee Platform
- Arkoma Basin
- Wolfcamp
- Cisco
- Misener
- Reagan
- Simpson

- Industrial and power facilities emit 2.7 Mt CO₂,e per year
- 45Q-eligible facilities emit 600,000 mt CO₂,e per year
- 300,000 mt CO₂ per year are capturable in the near- to medium-term
Many industrial facilities are located along rail lines and often use rail transport to import and export goods. Railroads can also play a role in transporting captured carbon and hydrogen. Many of the facilities in the Kansas hub are located along major rail lines, facilitating connection to markets across the US.

Logistical challenges to carbon and hydrogen pipeline deployment can be reduced by following existing right-of-way of natural gas and oil lines. The Kansas hub currently has 6,178 miles of natural gas pipelines and 3,421 miles of oil pipelines.

Kansas is centrally located between areas of rich geologic storage resource and existing CO₂ utilization. This offers potential for the state to become a nexus of long-distance CO₂ transport corridors under future scenarios where major CO₂ capture, transport, and storage occurs in accordance with US decarbonization goals. The state of Kansas has 14 miles of existing CO₂ pipeline, and unlike most other states, is adjacent to a major concentration of the nation’s existing CO₂ pipelines.

Freight trucks and barges can each play a role in the development of carbon and hydrogen transport networks. Both transport options are flexible, enabling routes to evolve over time and the frequency of transport to adapt in line with the volume of material being transported. Major ports along rivers in the Midcontinent region can connect Kansas with broader markets for carbon and hydrogen.

<table>
<thead>
<tr>
<th>Infrastructure</th>
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</tbody>
</table>

45Q-eligible facility

Existing hydrogen production

Existing CO₂ pipelines

Natural gas pipelines

Oil pipelines

Interstate highway

Navigable waterway

Major port
GPI’s Atlas of Carbon and Hydrogen Hubs

An Atlas of Carbon and Hydrogen Hubs for United States Decarbonization

February 2022

Download the report at carboncaptureready.org

About the Great Plains Institute
A nonpartisan, nonprofit organization, the Great Plains Institute (GPI) is transforming the energy system to benefit the economy and environment. Working across the US, we combine a unique consensus-building approach, expert knowledge, research and analysis, and local action to find and implement lasting solutions. Our work strengthens communities and provides greater economic opportunity through creation of higher paying jobs, expansion of the nation’s industrial base, and greater domestic energy independence while eliminating carbon emissions.

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