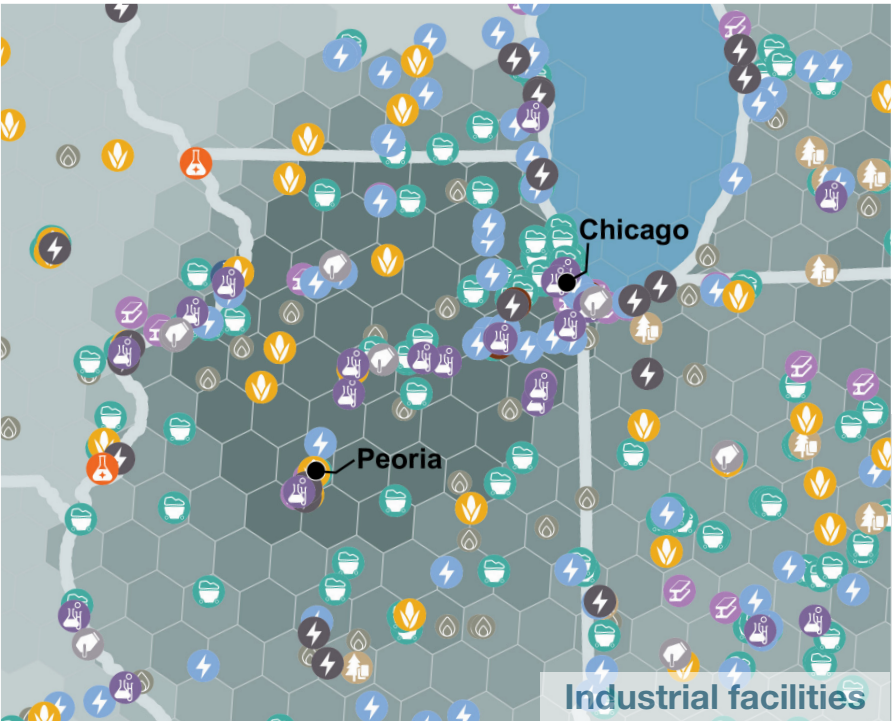


# Illinois Hub

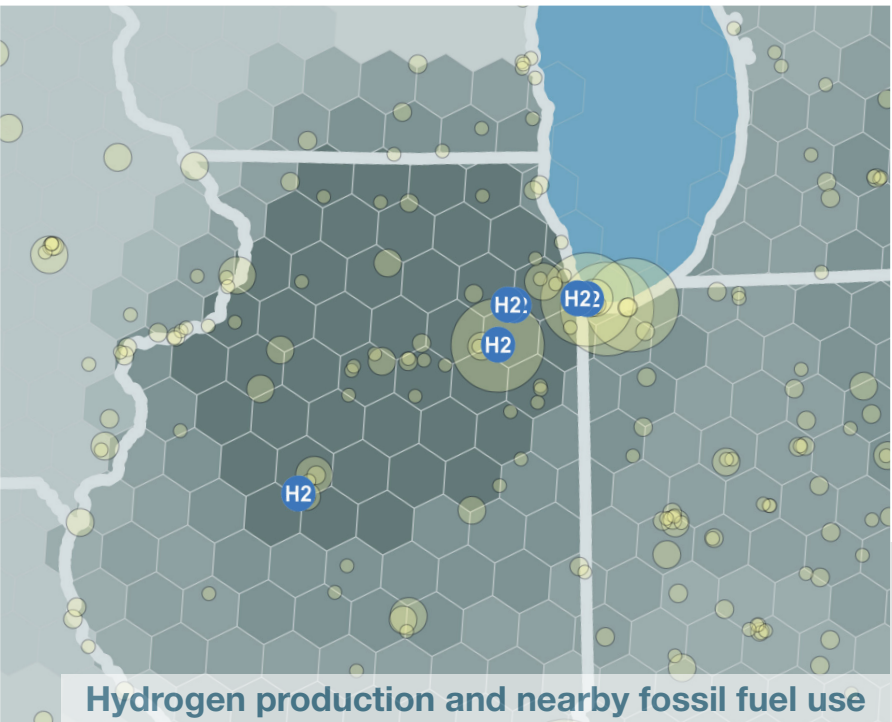
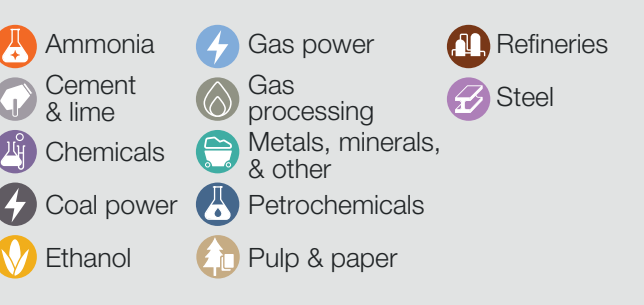
The existing landscape of industrial production, commodity transport infrastructure, and geologic carbon storage capacity make Illinois a potential launching point for investment in carbon capture and low-carbon hydrogen deployment.



## Industrial Emissions and Fossil Fuel Use

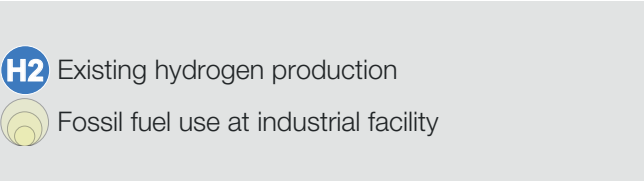


Illinois is home to a high number and concentration of diverse industries, including steel and steel products manufacturing, ethanol production, and chemicals production. Facilities in the Illinois hub emit 78.1 million metric tons (Mt) of CO<sub>2</sub>e annually, including 33.6 Mt from stationary combustion and 21.6 Mt from process emissions. There are 43 facilities in this regional hub that are eligible for the 45Q tax credit based on their current emissions profile.



There are **six hydrogen-producing facilities** in the Illinois hub, five of which are co-located with the area's central cluster of industrial activity and fossil fuel use. Industrial facilities in this regional hub use a total of 367 million MMBtu of fossil fuels per year.

Hydrogen can be used as a low- or zero-carbon alternative to fossil fuels at industrial facilities. Clusters of hydrogen production and fossil fuel demand can facilitate technology deployment and jumpstart the transition to hydrogen.



## Industrial facility emissions

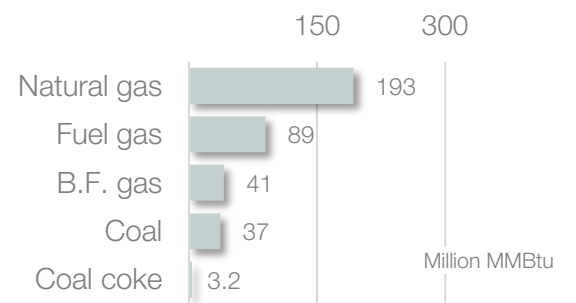
Sector	Total # of Facilities	Total Emissions	Stationary Combustion Emissions	Process Emissions
Ammonia	2	2.4	0.8	1.6
Cement	5	2.7	0.8	1.8
Chemicals	16	1.5	0.7	0.9
Coal power plants	7	13.9	< 0.1	-
Ethanol	13	10.5	5.0	5.5
Gas power plants	27	10.0	0.9	0.0
Gas processing	18	3.1	0.7	2.4
Metals, minerals & other	50	3.4	3.1	0.4
Petrochemicals	2	0.7	0.7	-
Refineries	3	9.2	5.0	2.9
Steel & steel products	14	22.0	15.9	6.1
<b>Total</b>	<b>157</b>	<b>78.1</b>	<b>33.6</b>	<b>21.6</b>

All emissions are in million metric tons CO<sub>2</sub>e.

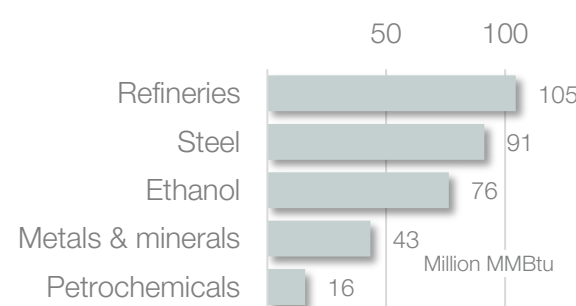
The top industrial fuels consumed in the Illinois hub include natural gas at 193 million MMBtu per year and fuel gas at 189 million MMBtu per year. Refineries and steel plants are the largest consumers of fossil fuels in this regional hub, consuming 105 million MMBtu and 91 million MMBtu of fossil fuels, respectively.

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.

## Top industrial fuels consumed



## Largest fuel-consuming industries

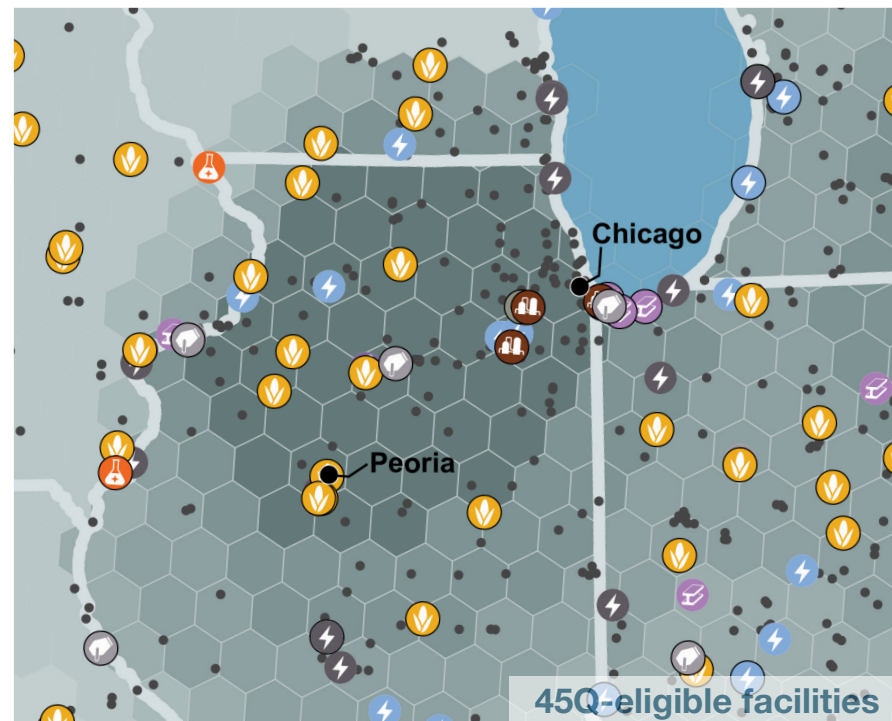


# Illinois Hub

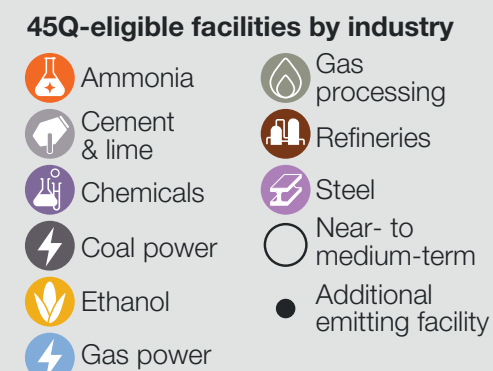
Carbon capture and storage is an essential tool for achieving midcentury climate goals, maintaining the competitiveness of US industry, and protecting and creating high-wage jobs. Carbon capture is crucial in decarbonizing key carbon-intensive industries where CO<sub>2</sub> emissions are inherent to 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.



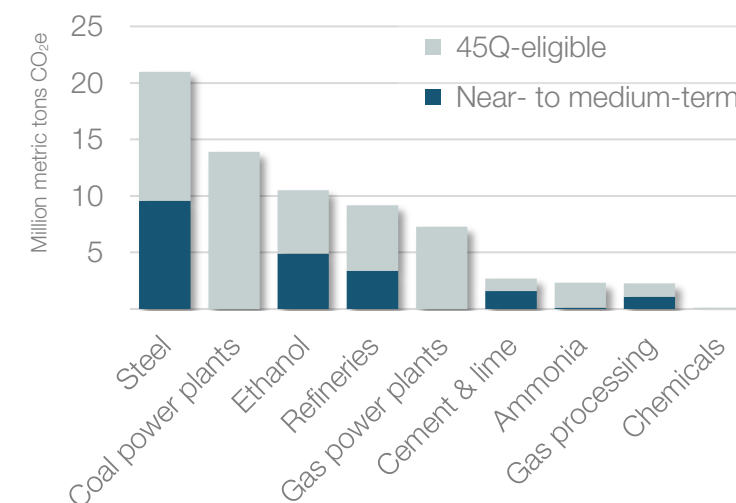
## Carbon Capture and Storage



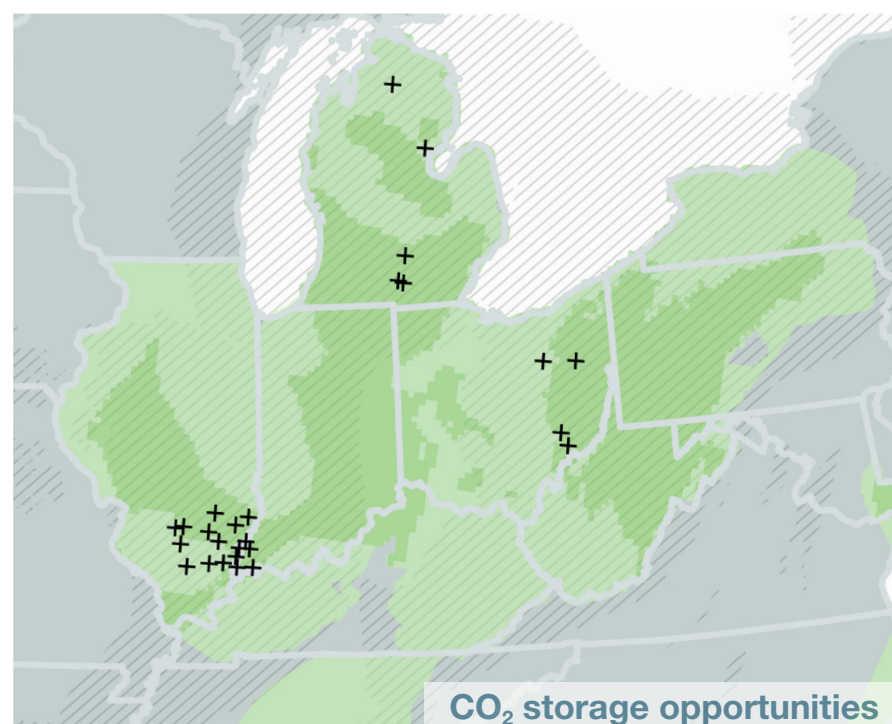
The Section 45Q tax credit lowers cost barriers to carbon capture and storage. Among the 43 industrial and power facilities in the Illinois hub that meet emissions thresholds for Section 45Q eligibility, 25 have been identified as near- to medium-term candidates for capture retrofit over the next 10 to 15 years.



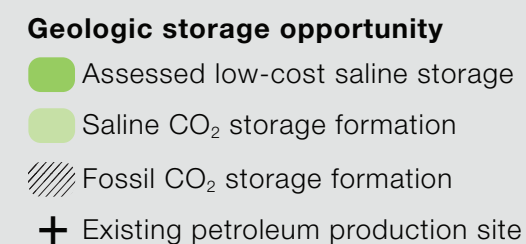
## Carbon capture opportunities



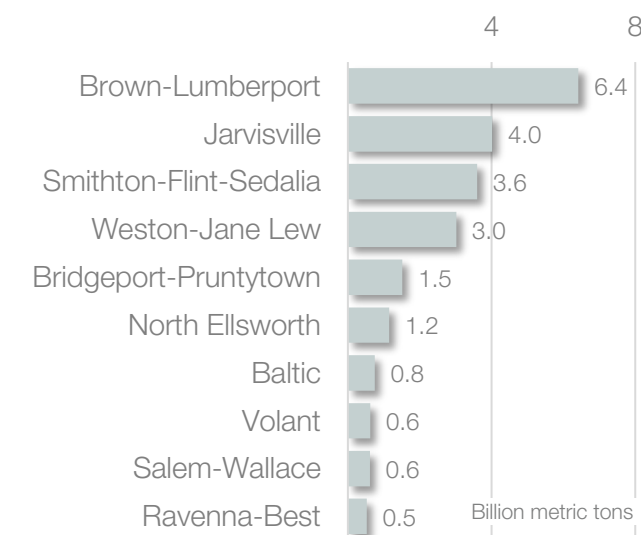
- Industrial and power facilities emit **78.1 Mt CO<sub>2</sub>e per year**
- 45Q-eligible** facilities emit **69.1 Mt CO<sub>2</sub>e per year**
- 21.4 Mt CO<sub>2</sub> per year** are **capturable** in the **near- to medium-term**



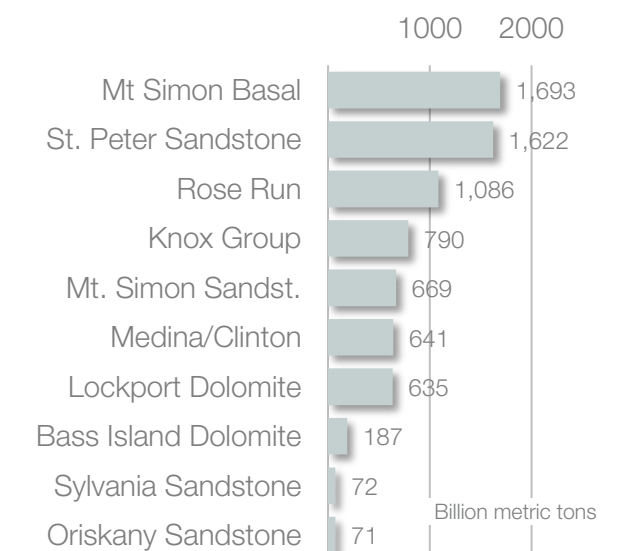
Illinois has potential to act as a major carbon storage destination for capture facilities and carbon removal throughout the Midwest and Mid-Atlantic regions. The state of Illinois has potential to store 87 billion metric tons of CO<sub>2</sub> in secure geologic saline formations, and also has extensive capacity for carbon storage in geologic fossil basins.



## Fossil storage formations by CO<sub>2</sub> storage capacity



## Saline storage formations by CO<sub>2</sub> storage capacity





# Illinois Hub

Industrial hubs can offer existing transportation infrastructure, delivery routes, and distribution networks needed for the efficient supply of feedstocks and delivery of products. Hydrogen may be blended into existing natural gas pipelines for co-firing, and both carbon and hydrogen could be transported by rail, freight trucking, or barge. Existing pipeline rights-of-way may be crucial for efficient and equitable routing of new CO<sub>2</sub> pipelines for utilization and permanent storage.

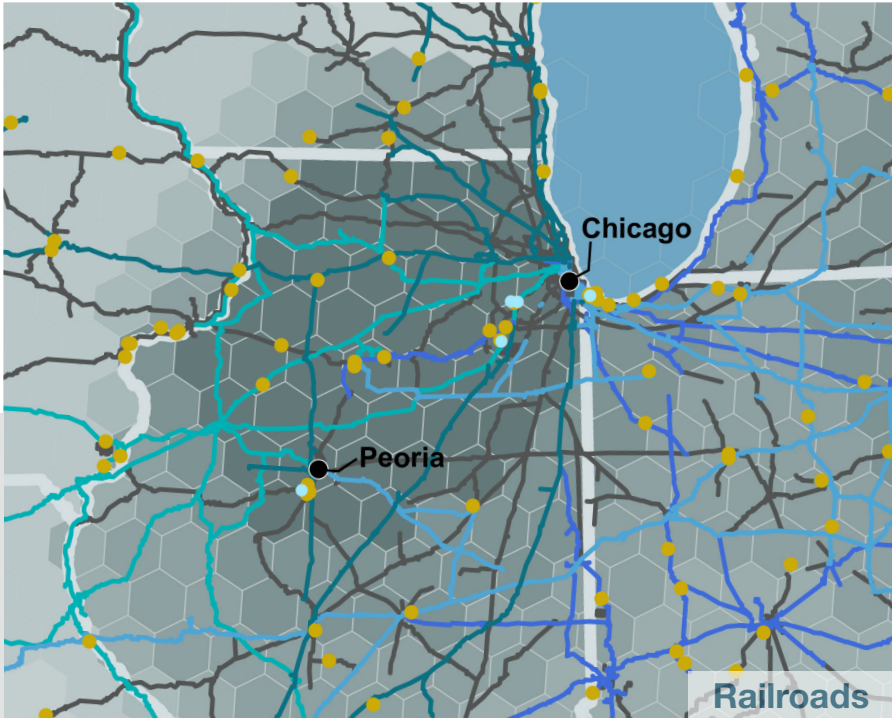


## Transport Infrastructure

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 Illinois hub are located along major rail lines, facilitating connection to markets across the US.

### Railroad networks

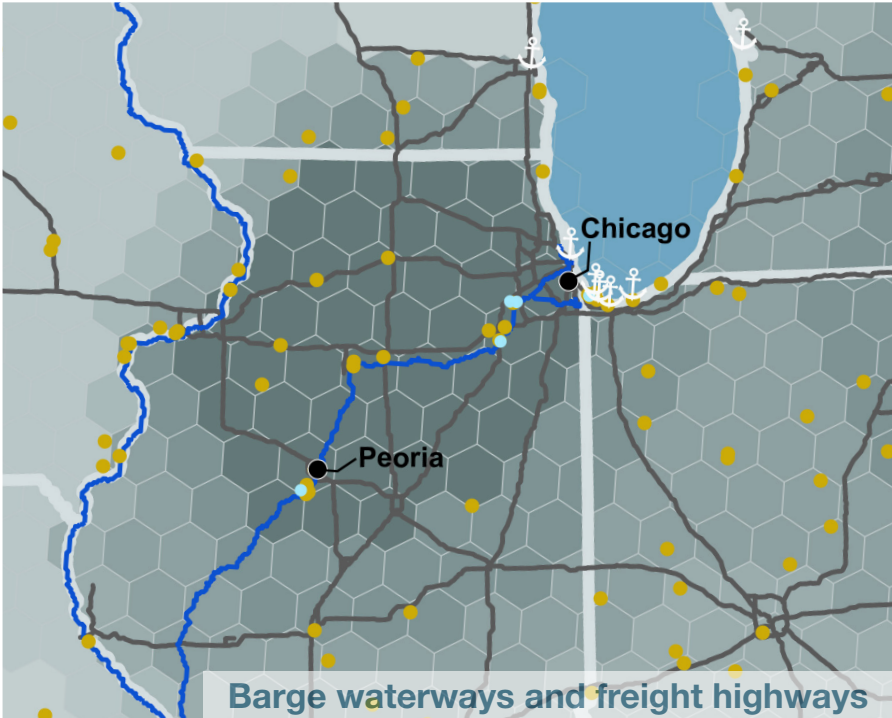
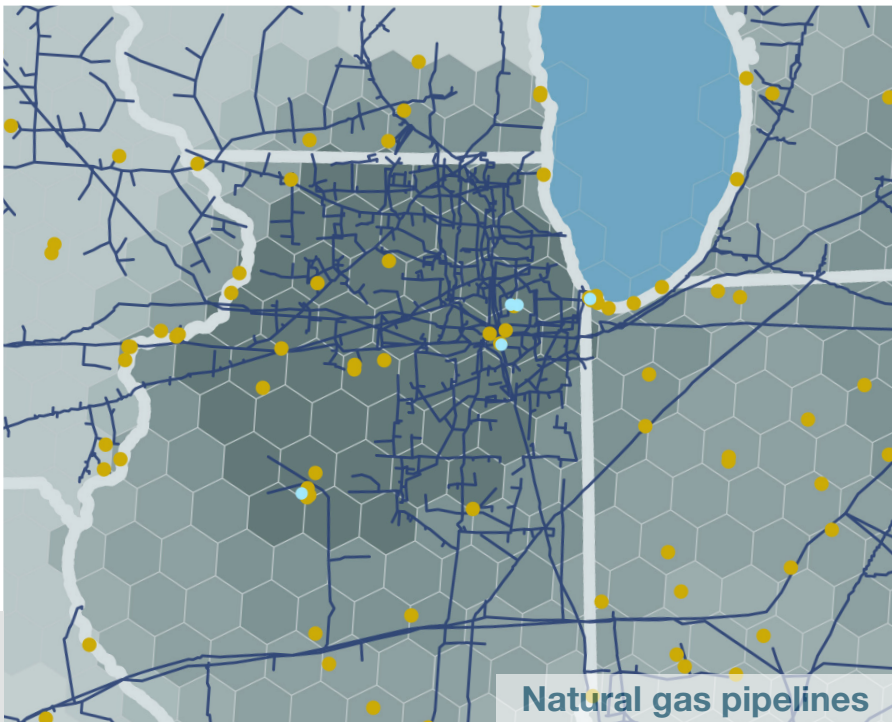
- Union Pacific Railroad
- BNSF Railway
- CSX Transportation
- Norfolk Southern Railway
- All others



Logistical challenges to carbon and hydrogen pipeline deployment can be reduced by following existing right-of-way of natural gas lines. The Illinois hub currently has 5,188 miles of natural gas pipelines.

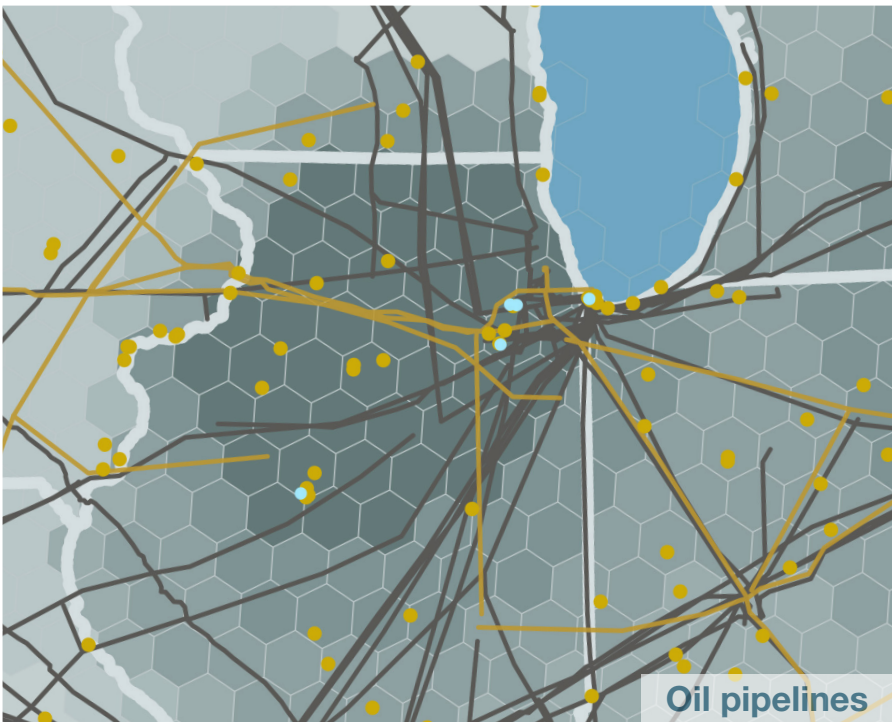
Infrastructure	Miles
Natural gas pipelines	5,188
Oil pipelines	8,664

- Existing CO<sub>2</sub> pipelines
- Natural gas pipelines



Freight trucks and barges are both flexible carbon and hydrogen transport options, enabling routes to evolve over time and the frequency of transport to adapt in line with the volume of material being transported. With major ports on Lake Michigan and access to key shipping channels along the Mississippi and Illinois rivers, Illinois is well-positioned to access domestic and international markets for carbon and hydrogen.

- Interstate highway
- Navigable waterway
- Major port



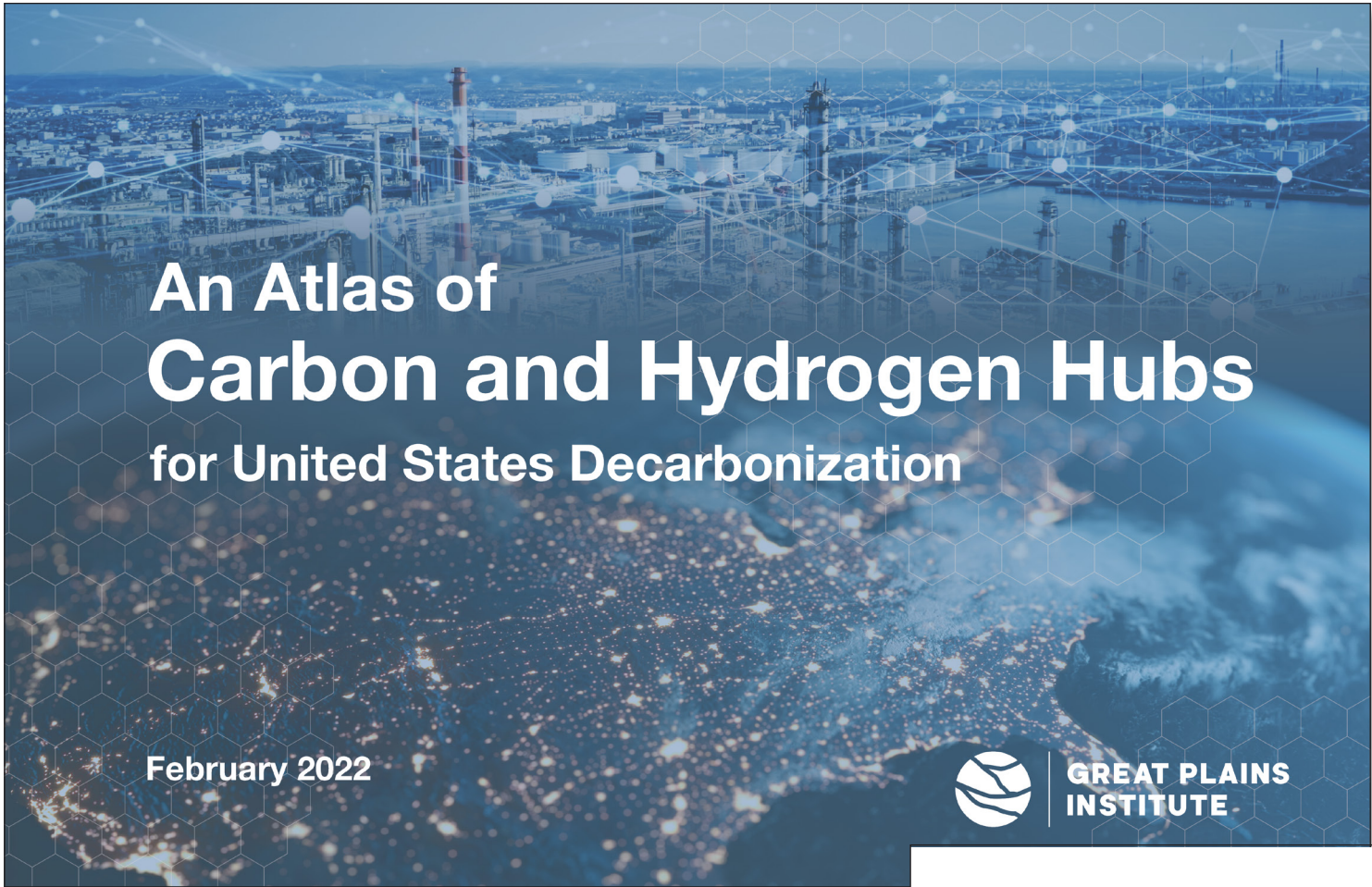
Collocating new CO<sub>2</sub> and hydrogen pipelines along existing pipeline routes can maximize efficiency and reduce surface impacts. New CO<sub>2</sub> and hydrogen pipelines could follow existing right-of-way established along the Illinois hub's 8,664 miles of oil pipelines to achieve efficient buildout.

- 45Q-eligible facility
- Existing hydrogen production

- Existing CO<sub>2</sub> pipelines
- Hydrocarbon gas liquids pipelines
- Petroleum pipelines



# GPI's Atlas of Carbon and Hydrogen Hubs



## 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.

Learn more: [www.betterenergy.org](http://www.betterenergy.org)

Download the report at  
[carboncaptureready.org](http://carboncaptureready.org)

