

Oklahoma CCS | Data Catalog

State-level interest in carbon capture storage/sequestration (CCS) is on the rise. Oklahoma is known for its abundant oil and gas reservoirs. The CCS potential of the same reservoirs is unknown despite having a long history of reservoir studies. The University of Oklahoma (OU) [Carbon Storage Utilization Partnership \(CUSP\)](#) team is interested in having an initial State estimate of CCS potential calculated for deep, saline reservoirs in Oklahoma.

The goal of this catalog of accessible information (data) and resources was to complete a cursory analysis of data inventory for a selected region (select counties) in Oklahoma (OK). The type of data available, quality and gaps in data were recorded for all data that pertained to calculating CCS.

Site Directory

OK CCS Data Catalog

This documentation is based on the UT State Catalog PDF.

Scope

Project objectives

Data Access

All data presented in this catalog is accessible online via access points (URLs), with the specific URL link(s) listed with the pertinent data. Many of the data sources are freely available sites and domains, representing original, unaltered data used for aspects of the CUSP project. The subsequent pages in the table of contents list the cataloged data and resources. Data infrastructure and organization Most of the data cataloged is in tabular, flat-file or GIS formats. Organization of certain datasets was performed to be housed within a database format. SQLite and Geopackages were both chosen to promote in ease of accessibility and dissemination.

Regulatory

Summary of regulatory data

Economics

Summary of economics data

Liability

Summary of liability concerns

Public & Stakeholder Outreach

Summary of public and stakeholder outreach

Spatial Data

Summary of spatial data resources

Geological Characterization

Summary of geologic characterization data

CO2 Source/Capture

Summary of CO2 source and capture data.

CCUS & Geological Characterization Projects

Summary of CCUS Projects in Oklahoma

Data Gaps

Summary of data gaps

Data Sources

Summary of compiled data sources

Software

Summary of software and applications used and available

Bibliography

List of literature and other reference resources

Overview

OK CCS Data Catalog

This documentation is based on the UT State Catalog PDF.

Scope

Project objectives

Catalog Document Scope

This document provides a catalog listing of the accessible data compiled by the OU-CUSP Team for the purposes of accelerating CCS in Oklahoma and the Midcontinent. The catalog of data covers many of the technical and non-technical tasks that the OU-CUSP Team has undertaken to achieve the objectives of the CUSP Project. The purpose of this catalog is not to necessarily list specific data, but rather the sources of data needed for Oklahoma to address CUSP objectives.

Phase I Project Scope (Spring 2021)

State-level interest in carbon capture storage/sequestration (CCS) is on the rise. Oklahoma is known for its abundant oil and gas reservoirs. The CCS potential of the same reservoirs is unknown despite having a long history of reservoir studies. The University of Oklahoma (OU) [Carbon Storage Utilization Partnership \(CUSP\)](#) team is interested in having an initial State estimate of CCS potential calculated for deep, saline reservoirs in Oklahoma.

The goal of this catalog of accessible information (data) and resources was to complete a cursory analysis of data inventory for a select counties (Texas, Garvin, Beaver, Stephens, Caddo, Carter, Pontotoc, McIntosh, Marshall, Hughes, Creek) in Oklahoma. The type of data available, quality and gaps in data were recorded for all data that pertained to calculating CCS potential.

Data Access

All data presented in this catalog is accessible online via access points (URLs), with the specific URL link(s) listed with the pertinent data. Many of the data sources are freely available sites and domains, representing original, unaltered data used for aspects of the CUSP project.

The subsequent pages in the table of contents list the cataloged data and resources.

Data infrastructure and organization

Most of the data cataloged is in tabular, flat-file or GIS formats. Organization of certain datasets was performed to be housed within a database format. [SQLite](#) and [Geopackages](#) were both chosen to promote in ease of accessibility and dissemination. Data compiled into such database formats will also have flat-file exports available.

It is the goal of OU-CUSP Team to promote and ensure all data used in CCS work to be available as open source/open access including the software used in CCS work. Please contact the Team if any data is difficult to find or otherwise absent. This includes missing data or new data sources that you would like to add to the catalog. We openly support industry involvement in submitting publicly available datasets to forward the science of CCS.

Specific thematic data available was compiled into database formats and are updated regularly include:

1. CCUS Data - [Geopackage](#) | [Flat Files](#) 2. Geoscience Data - [Geopackage](#) | [Flat Files](#) 3. Reference (culture) Data - [Geopackage](#) | [Flat Files](#) 4. USGS Data - [Geopackage](#) | [Flat Files](#) 5. Well Data - [SQLite](#) | [Geopackage](#) | [Flat Files](#)

To contact a project team member about the repo please email ...

Regulatory

Summary of regulatory data

Federal, state, and local regulatory / legal / legislative issues (barriers) that may hinder project deployment are identified and assessed. These issues include UIC regulations, air quality regulations, water quality regulations, leasing rules for federal or state-owned pore space, leasing rules for surface rights and protocols for securing

rights-of-way for any necessary CO² transport infrastructure for the range of private and government-owned land parcels in the storage complex. Strategies to address the regulatory / legal / legislative barriers will be developed.

EPA Class VI Rules and Requirements

The primary regulatory issue related to commercial-scale CCS is the EPA Class VI rule. The project assessed requirements for the injections and storage of CO² underground, including regulatory requirements under the Safe Drinking Water Act.

Title/Resource	Description	URL/Source
EPA Class VI Guidance Documents (all)	Final Class VI Guidance documents	EPA Class VI Guidance Documents
Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO ²) Geologic Sequestration (GS) Wells	Regulatory requirements of the EPA VIC Class VI rule.	Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO²) Geologic Sequestration (GS) Wells

Rights-of-Way

The project is assessing requirements for transport of CO² from the generation site (power plant) to the injection site(s), either utilizing existing rights-of-way or new ones. A number of general regulatory requirements applicable to CO² pipelines have been identified.

Title/Resource	Description	URL/Source
Obtaining a Right-of-Way on Public Lands	General information pertaining to applying for Federal Rights-of-Way access	Obtaining a Right-of-Way on Public Lands
Rights-of-Way Under the Federal Land Policy Management Act (FLPMA)	Detailed information pertaining to applying for Federal Rights-of-Way access.	Rights-of-Way Under the Federal Land Policy Management Act (FLPMA)
Application for Transportation and Utility Systems and Facilities on Federal Lands		Application for any CO² or related system(s) on Federal Lands

Pore Space & Land Ownership

The project is assessing property law constraints according to pore ownership rules for mineral rights. As of this writing, pore space ownership is linked to surface ownership until pore space or rights, interests or estates

in the pore spaces are separately transferred. Evaluation of the land ownership in the project area was undertaken using GIS maps, shapefiles and geodatabases.

Title/Resource	Description	URL/Source
Commissioner of the Land Office	GIS web map displaying inventory of lands managed by the CLO and leases available at auction.	Commissioner of the Land Office

DEQ (Class I UIC Well Primacy)

Title/Resource	Description	URL/Source
Department of Environmental Quality UIC Well Permits (Class I Primacy)	DEQ requirements for UIC Class I permits	Department of Environmental Quality

Oklahoma Corporation Commission (Class II, III, IV, V Well Permit Primacy)

Title/Resource	Description	URL/Source
OCC Oil and Gas Division - UIC and ISD	OCC UIC and ISD Class II, III, IV, and V permit requirements	OCC Oil and Gas Division - UIC and ISD
Rules	Corporation Commission Rules	Rules

Economics

Summary of economics data

This section will identify state incentives/policies that impact project economics (long-term liability, tax incentives, rate base recovery, etc.) and public acceptance (e.g., relation to State Implementation Plans under Clean Power Plan). The team will also identify, quantify and document potential sources of revenue, and develop a sub-plan for obtaining off-take agreements for any major products (power, chemicals, CO², for enhanced oil recovery as a component of stacked storage, etc.).

Title/Resource	Description	URL/Source
IRS Credit for Carbon Dioxide Sequestration Under Section 45Q	Tax Code for Section 45Q regarding carbon capture	IRS 45Q
Primer 45Q: Tax Credit for Carbon Capture Projects	Summary of IRS 45Q Tax Credit	Great Plains 45Q Primer
DOE NETL CCUS Cost Model Resources	CCUS Cost Evaluation Tools	Cost Model Tools

Title/Resource	Description	URL/Source
Oklahoma Gross Production Tax Incentive	Gross Production Reporting System	OK Gross Production

Liability

Summary of liability concerns

The liability requirements associated with statutory and regulatory provisions are being identified and assessed. These include potential liability for violations of the Safe Drinking Water Act, the need for state or federal programs, like the Price-Anderson Act (e.g. civilian nuclear facilities), that create pools to cover remediation costs should long-term GCS facilities leak and analysis of insurance markets.

Title/Resource	Description	URL/Source
unknown		

Public & Stakeholder Outreach

Summary of public and stakeholder outreach

A four-step process is being utilized to address concerns and facilitate public acceptance:

1. Identify stakeholders with a potential interest in the project or area
2. Identify potential benefits and concerns for each stakeholder group
3. Develop strategies to maximize benefits and mitigate identified concerns and develop strategies to facilitate stakeholder acceptance.

An initial Public Outreach and Education effort will be undertaken to gauge public acceptability of an integrated CCS Project. In response to data gathered from Initial Outreach Efforts an Extended Public Outreach and Education strategy will be developed.

Title/Resource	Description	URL/Source
unknown		

Spatial Data

Summary of spatial data resources

GIS Shapefiles

The OU-CUSP Team will generate versions of GIS-based maps for geological interpretation, land ownership, environmental conditions, pipeline RoWs, etc. The majority of GIS data has been obtained through the U.S.

Bureau of Transportation Statistics and U.S. Census Bureau. The specific GIS shapefiles/geodatabases are:

Name	Source	License	GeoJSON	OGC WFS	Description
TIGER Line 2020 Oklahoma ALL	U.S. Census	License	none	none	Description
State Boundaries	Bureau of Transportation Statistics	License	Download	Download	Description
County Boundaries	Bureau of Transportation Statistics	License	Download	Download	Description
Populated Places (Cities)	Bureau of Transportation Statistics	License	Download	Download	Description
North American Roads	Bureau of Transportation Statistics	License	Download	Download	Description
Natural Gas Pipelines	Homeland Infrastructure Foundation-Level Data (HIFLD)	License	Download	none	Description
Topographic Maps	United States Geologic Survey (USGS)	none	none	none	Description
Utilities	unknown				
Water Data	Oklahoma Water Resources Board	License	none	none	Description
Cadastral Data	United States Geologic Survey (USGS)	License	none	none	Description
Energy Overview	Oklahoma Corporation Commission	none	none	none	none
Elevation and Terrain Data	Oklahoma GIS Data Clearinghouse	none	none	none	Description
Aerial/Satellite Photography	Oklahoma Corporation Commission	none	none	none	Description
Lidar	unknown				

Well Data

Name	Source	License	Description
OCC Well Records Imaging Application	Oklahoma Corporation Commission - OG Division	none	Description
OCC Case Processing Web Application	Oklahoma Corporation Commission - OG Division	none	Description
OCC Oil and Gas Data Mining Database	Oklahoma Corporation Commission - OG Division	none	Description
OCC Well Browse Database	Oklahoma Corporation Commission - OG Division	none	Description

Geologic Maps

CRUST 1.0

[CRUST 1.0 | A New Global Crustal Model @ 1x1 Degree by Gabi Laske, Zhitu Ma, Guy Masters and Michael Pasyanos \(LLNL\)](#)

Oklahoma Geological Survey - Open File Reports for Elevation (DEM) Grids of stratigraphic units in Oklahoma, Kasas, and parts of Nebrasks, Iowa, Missouri, Arkansas, and Texas

[OGS Publications](#)

OGS Open File No. (Report Link)	Unit	Series Age	PGM Plate No.	Page
OF 1-2018 PDF	Precambrian Basement	Precambrian	2	5
OF 2-2018 PDF	Arbuckle Group	Ordovician	8	35
OF 3-2018 PDF	Simpson Group	Ordovician	9	39
OF 4-2018 PDF	Viola Limestone	Ordovician	10	47
OF 5-2018 PDF	Sylvan Shale	Ordovician	11	49
OF 6-2018 PDF	Hunton Group	Silurian	12	53
OF 7-2018 PDF	Woodford Shale	Devonian	14	67
OF 8-2018 PDF	Pre-Chesterian Mississippian Rocks	Mississippian	15	74
OF 9-2018 PDF	Chesterian Series	Mississippian	16	80

OGS Open File No. (Report Link)	Unit	Series Age	PGM Plate No.	Page
OF 10-2018 PDF	Morrowan Series	Pennsylvanian	18	94
OF 11-2018 PDF	Atokan and Desmoinesian Series	Pennsylvanian	19	107
OF 12-2018 PDF	Missourian and Virgilian Series	Pennsylvanian	20	113
OF 13-2018 PDF	Wolfcampian Series	Permian	21	119
OF 14-2018 PDF	Leonardian Series	Permian	22	128
OF 15-2018 PDF	Guadalupian Series	Permian	23	129
OF 16-2018 PDF	Triassic and Cretaceous Systems	Triassic and Cretaceous	24	130
OGS OF No. (Data Link)	Dataset Name	Data Type		
OF 1-2018S ZIP	Precambrian Basement Data	GIS		
OF 2-2018S ZIP	Arbuckle Group Data	GIS		
OF 3-2018S ZIP	Simpson Group Data	GIS		
OF 4-2018S ZIP	Viola Limestone Data	GIS		
OF 5-2018S ZIP	Sylvan Shale Data	GIS		
OF 17-2018S ZIP	Woodford Shale Data	GIS		
OF 1-2016S ZIP	Industry Faults	GIS		
OF 3-2015 ZIP	OGS Faults	GIS		
OF 4-2015 ZIP	Fault Orientations	GIS		
GM 37S ZIP	Field Outlines	GIS		
GM 38S ZIP	Reservoir Outlines by Age	GIS		

OGS OF No. (Data Link)	Dataset Name	Data Type
GM 39S ZIP	Oil and Gas Fields Distinguished by Gas to Oil Ration and Gas to Coalbed Methane	GIS
GM 40S ZIP	CBM Feilds	GIS

Geoscience Data

Name	Source	Data Type
RCSPSalineOutline	NATCARB Viewer	GIS
RCSPSalineBasin10kmGrid	NATCARB Viewer	GIS
NorthAmericanSedimnetaryBasins	NATCARB Viewer	GIS
NATCARB Viewer CO2StationarySources	NATCARB Viewer	GIS
NATCARB Viewer WorldCarbonCapture&StorageDatabase	NATCARB Viewer	GIS
BrineGeochemicalDatabase_shp	NATCARB Viewer	GIS
Surface Geology	USGS	GIS

Geological Characterization

Summary of geologic characterization data

The geological, geophysical, and hydrological properties of reservoir formations and all overlying seal formations for candidate sites will be described in detail. These characterization efforts will rely on leveraging existing data including 2D lines, available well logs, reports, core data and core samples.

Phase I (initial study)

Seismic (reflection, refraction surveys)

The Consortium for Continental Reflection Profiling (COCORP) project collected several 2D regional seismic lines in the Anadarko Basin and Wichita Uplift area. These 2D seismic lines are some of the only publicly available seismic data for Oklahoma. The data was collected via multichannel seismic reflection and aimed to profile the continental lithosphere.

- [COCORP 2D Seismic Lines](#)

Oklahoma does not possess significant non-commercial, open-access legacy seismic data. Unless specific cooperative agreements are arranged with industry stakeholders, the most likely path to existing seismic acquisition is a commercial data clearinghouse. There are various seismic vendors who maintain a large collection of legacy 2D and 3D seismic lines in Oklahoma. All lines are available for purchase from various

seismic vendors listed below. This is not an exhaustive list but does include longstanding seismic providers, processors, and brokers for the region.

- [Seismic Exchange](#)
- [Seitel](#)
- [TGS](#)
- [IHS Markit](#)
- [Silverthorne Seismic](#)
- [Flamingo Seismic](#)
- [Midcon Seismic Brokerage](#)
- [CGG](#)
- [Dawson](#)

Geologic Maps, Cross-sections, Stratigraphic Columns

- [Oklahoma Geological Survey Maps and Cross-sections](#)
- [OGS Stratigraphic Guide](#)
- [OCC Stratigraphic Column - for regulatory use](#)
- [Oklahoma City Geologic Society](#)
- [Tulsa Geologic Society](#)

The Oklahoma Geological Survey, the United States Geological Survey, and the Geology Department at the University of Oklahoma have developed a variety of geologic maps, cross-sections and stratigraphic columns. Various public reports and student theses are available from eat. Additional focused work can be available from a variety of journals. The Oklahoma Corporation Commission (OCC) uses the referenced stratigraphic columns for regulatory purposes.

Logs (LAS | Images)

- [Oklahoma Corporation Commission](#)
- [Oklahoma City Geologic Society](#)
- [Tulsa Geologic Society](#)

Log ASCII Standard (LAS) files from oil and gas wells in and around the project study areas can be used to generate geological models, correlate geologic units, tie adjacent wells and perform seismic well tie analyses. The useful petrophysical data in the LAS files includes: Gamma Ray, Resistivity, Caliper, Spontaneous Potential, Neutron Porosity and Density Porosity. The Oklahoma Corporation Commission does not require operators to submit LAS files for record, only well log image files. Efforts to digitize or broker LAS files from third parties will need to be weighed.

Well Information

- [Oklahoma Corporation Commission](#)

Well information cards contain useful data about wells that can be used to aid in interpretation of geology, oil and gas field operators, and other infrastructure/regulatory requirements.

Produced Water Geochemistry

- [USGS Produced Waters Database](#)

Historical oil and gas production from wells in and around potential sites can be searched for water chemistry that aids the model and simulation effort, as well as the evaluation of reservoirs and aquifers for suitability of CO² storage activities. The primary resources was the USGS Produced Waters Database.

Injection Well Volumes

- [Oklahoma Corporation Commission](#)

Data from saltwater disposal wells can provide data that is useful as an analog for CO² injection and also must be considered for pressure effects.

Rock property and Geochemical Data (porosity, permeability, relative permeability, capillary pressure, etc.)

- [Oklahoma Geological Survey](#)

Rock property data may be available from drill core, cuttings and/or outcrop and analogs. Porosity, permeability, relative permeability, wettability and capillary pressure measurement data are sometimes available from oil/gas divisions or published reports. This data may be available through the OGS for select cores that have been extensively studied in the State. However, this data can be collected on cores through OGS and OPIC.

Formation Tops

- [Oklahoma Geological Survey](#)
- [Oklahoma Corporation Commission - Oil and Gas Imaged Well Records \(1002A\)](#)

The OGS will house some formation top data and contain formation information in select publications and accompanying datasets. The OCC collects formation top data from operators in the Form 1002A.

Cuttings | Mudlogs

- [Oklahoma Geological Survey](#)
- [Oklahoma Corporation Commission](#)
- [Oklahoma City Geologic Society](#)
- [Tulsa Geologic Society](#)

The OGS/OPIC houses cuttings and are available for public viewing (call ahead for fees/pricing). OGS, OCGS and TGS may have mudlogs available in addition to the OCC log database.

Core

- [Oklahoma Geological Survey - Slimhole Core Database](#)
- [Oklahoma Petroleum Information Center \(OPIC\) - OGS](#)

Core is available through OPIC (call ahead for fees/pricing) and the OGS houses a slimhole core database.

Earthquakes

- [OGS Earthquake Catalog](#)
- [USGS National Earthquake Catalog](#)

CO² Source/Capture

Summary of CO² source and capture data

Most significant CO² source and emission data is derived from national databases. Some States may have local databases of CO² capture assessments.

CO² Sources and Emission Data

- [NATCARB-CO2 Stationary Sources](#)
- [NATCARB- GeoCube Resources](#)
- [US EIA](#)

CO² Capture (Technology and Cost)

- [Great Plains Institute](#)

CCUS & Geological Characterization Projects

Summary of CCUS Projects in Oklahoma

Several CCS projects have been undertaken in the State primarily for enhanced oil recovery (EOR).

Farnsworth Oil Field (EOR)

- [Farnsworth Field](#)
- In Phase III of development of a ~1 million Mt (metric tonnes) facility targeting the Pennsylvanian Morrow formation in the FWU Area. The source of the CO² is from nearby ethanol and fertilizer plants. Chaparral LLC is the current field operator.

Burbank Oil Field (EOR)

Data Gaps

Summary of data gaps

Current and Future Data Needs

- Publicly available digital well logs for the State of Oklahoma are only available as log images (tiff). Depth calibration of these logs and digitization (LAS) is necessary for detailed well analyses and correlations.
- Publicly available 2D and 3D seismic data is extremely limited.
- Publicly available well coordinates are not complete in the data available.

Data Sources

Summary of compiled data sources

National Carbon Storage Programs

- [DOE-NETL Carbon Storage Technology Program](#)
- [DOE Carbon Storage Research](#)
- [NETL Energy Data eXchange](#)
- [DOE-NETL Best Practices Manuals](#)
- [DOE-NETL Regional Carbon Sequestration Partnerships \(RCSP\) Initiative](#)
- [DOE-NETL Carbon Storage Program](#)
- [DOE-NETL CarbonSafe](#)
- [NATCARB Viewer](#)
- [DOE-NETL Carbon Capture Conference Proceedings](#)
- [DOE-NETL Carbon Capture and Storage Database](#)
- [DOE-NETL Storage Infrastructure Projects](#)
- [DOE-NETL CO2 Storage Formations](#)
- [DOE-NETL CO2 Stationary Sources](#)
- [CCSI2 Carbon Capture Simulation Initiative \(CCSI\) Toolset Released](#)
- [CCSI Toolset](#)
- [DOE-NETL Carbon Storage Program](#)
- [DOE-NETL CarbonStorage Project Portfolio](#)
- [DOE-NETL Carbon Utilization Resources](#)

Southwest CCUS Partners - Regional Program

- [Southwest CCUS Partnership](#)
- [Kansas - KGS](#)
- [Arizona - AZGS](#)
- [Washington](#)
- [Oregon](#)
- [Idaho](#)
- [Montana \(Montana State University\)](#)
- [California \(Stanford University\)](#)
- [Nevada - \(Desert Research Institute\)](#)
- [Utah \(University of Utah and Utah Geological Survey\)](#)
- [Colorado - Colorado School of Mines](#)
- [New Mexico \(Los Alamos National Laboratory, New Mexico Tech, Sandia National Laboratory\)](#)
- [Texas \(University of Texas Permian Basin\)](#)
- [Indiana - Indiana University](#)

Partner Projects Documentation, Tools and Workflows

- [KGS CO2 Sequestration Project - Home](#)
- [KGS CO2 Sequestration Phase I Data/App Templates](#)
- [KGS CO2 Sequestration Phase II Data/App Templates](#)

- [KGS CO2 I ToolsDownload JAVA Source Code](#)
- [KGS Presentations](#)
- [KGS South-central Kansas CO2 ProjectCO2 SequestrationSummary Pages and Web Apps](#)
- [KGS CO2 II ToolsDownload JAVA Source Code](#)
- [KGS Online Interactive Map](#)
- [KGS Links](#)
- [South-Central Kansas CO2 Project Database Tables](#)
- [Bob Slamal Digital Type Logs Project Kansas Stratigraphic Units](#)
- [Tools](#)

US Regional CCUS Programs and Partnerships

- [Big Sky Carbon Sequestration Partnership](#)
- [Midwest Geological Sequestration Consortium](#)
- [Midwest Regional Carbon Initiative](#)
- [Regional Carbon Sequestration Partnerships \(RCSP\) Initiative](#)
- [Plains CO2 Reduction \(PCOR\) Partnership](#)
- [Southeast Regional Carbon Sequestration Partnership](#)
- [Southwest Carbon Sequestration Partnership](#)
- [West Coast Regional Carbon Sequestration Partnership](#)
- [Energy & Environmental Research Center Carbon Management](#)

Main Data Sources

- [Oklahoma Corporation Commission](#)
- [Oklahoma Geological Survey](#)
- [USGS](#)
- [U.S. Bureau of Transportation Statistics](#)
- [U.S. Census Bureau](#)
- [OK Maps - Oklahoma GIS Data Clearinghouse Search](#)
- [NATCARB Viewer](#)

Software

Summary of software and applications used and available

The availability and cost of various software and tools vary. Below is a listing of the software used, the use-case, cost and license structure.

Open Source Geoscience Software Compilation

- [Awesome Open Geoscience](#)
- [QGIS](#)
- [Engauge Digitizer](#)

Open Source CCS Software

- [SimCCS GitHub Repository](#) Commercial-scale carbon capture and storage (CCS) technology will involve deploying infrastructure on a massive and costly scale. This effort will require careful and comprehensive planning to ensure that capture locations, storage sites, and the dedicated CO₂ distribution pipelines are selected in a robust and cost-effective manner. Introduced in 2009, [SimCCS is an optimization model](#) for integrated system design that enables researchers, stakeholders, and policy makers to design CCS infrastructure networks. SimCCS2.0 is a complete, ground-up redesign that is now a portable software package, useable and shareable by the CCS research, industrial, policy, and public communities. SimCCS2.0 integrates multiple new capabilities including a refined optimization model, novel candidate network generation techniques, and optional integration with high-performance computing platforms. Accessing user-provided CO₂ source, sink, and transportation data, SimCCS2.0 creates candidate transportation routes and formalizes an optimization problem that determines the most cost-effective CCS system design. This optimization problem is then solved either through a high-performance computing interface, or through third-party software on a local desktop computing platform. Finally, SimCCS2.0 employs an open-access geographic information system framework to enable analysis and visualization capabilities. SimCCS2.0 is written in Java and is publicly available via GitHub to encourage collaboration, modification, and community development.

Proprietary Licensed Software

- IHS Markit Kingdom
- IHS Markit Petra
- Esri ArcGIS
- Blue Marble GlobalMapper

Languages, Frameworks, etc.

- [HUGO - Static Site Generator](#)
- Jupyter Notebooks
- Python-based charting, mapping packages (matplotlib, etc.)

Proprietary Oil and Gas Databases

Used to supplement sparse publicly available data for initial studies. This data has been released from output products.

- IHS Markit Enerdeq
- Enervus DrillingInfo

Bibliography

List of literature and other reference resources

- Buursink, M.L., Craddock, W.H., Blondes, M.S., Freeman, P.A., Cahan, S.M., DeVera, C.A., and Lohr, C.D., 2013, Geologic framework for the national assessment of carbon dioxide storage resources—Arkoma Basin, Kansas basins, and Midcontinent Rift Basin, chap. F of Warwick, P.D., and Corum, M.D., eds.,

Geologic framework for the national assessment of carbon dioxide storage resources: U.S. Geological Survey Open-File Report 2012–1024–F, 35 p., <http://dx.doi.org/10.3133/ofr20121024f>.^[^1]

- Laske, G., Masters., G., Ma, Z. and Pasyanos, M., Update on CRUST1.0 - A 1-degree Global Model of Earth's Crust, Geophys. Res. Abstracts, 15, Abstract EGU2013-2658, 2013.^[^2]
- [McPherson, Brian, et al., 2006, Southwest Regional Partnership on Carbon Sequestration: Final Report, 223 p.,](#)
- Erin M. O'Leary — Roy Long, The PCOR Partnership Decision Support System, 2016-09-29, <https://edx.netl.doe.gov/dataset/the-pcor-partnership-decision-support-system>
- Bauer, J., Rowan, C., Barkhurst A., Digiulio J., Jones K., Sabbatino M., Rose K., Wingo P. Natcarb, 2018-09-27, <https://edx.netl.doe.gov/dataset/natcarb>, DOI: 10.18141/1474110
- Richard S. Middleton, Sean P. Yaw, Brendan A. Hoover, Kevin M. Ellett, SimCCS: An open-source tool for optimizing CO2 capture, transport, and storage infrastructure, Environmental Modelling & Software, Volume 124, 2020, 104560, ISSN 1364-8152, <https://doi.org/10.1016/j.envsoft.2019.104560>.
- U.S. Department of Energy National Energy Technology Laboratory (DOE/NETL). Carbon Storage Atlas – Fifth Edition (Atlas V); 2015. <https://www.netl.doe.gov/research/coal/carbon-storage/atlasv>.