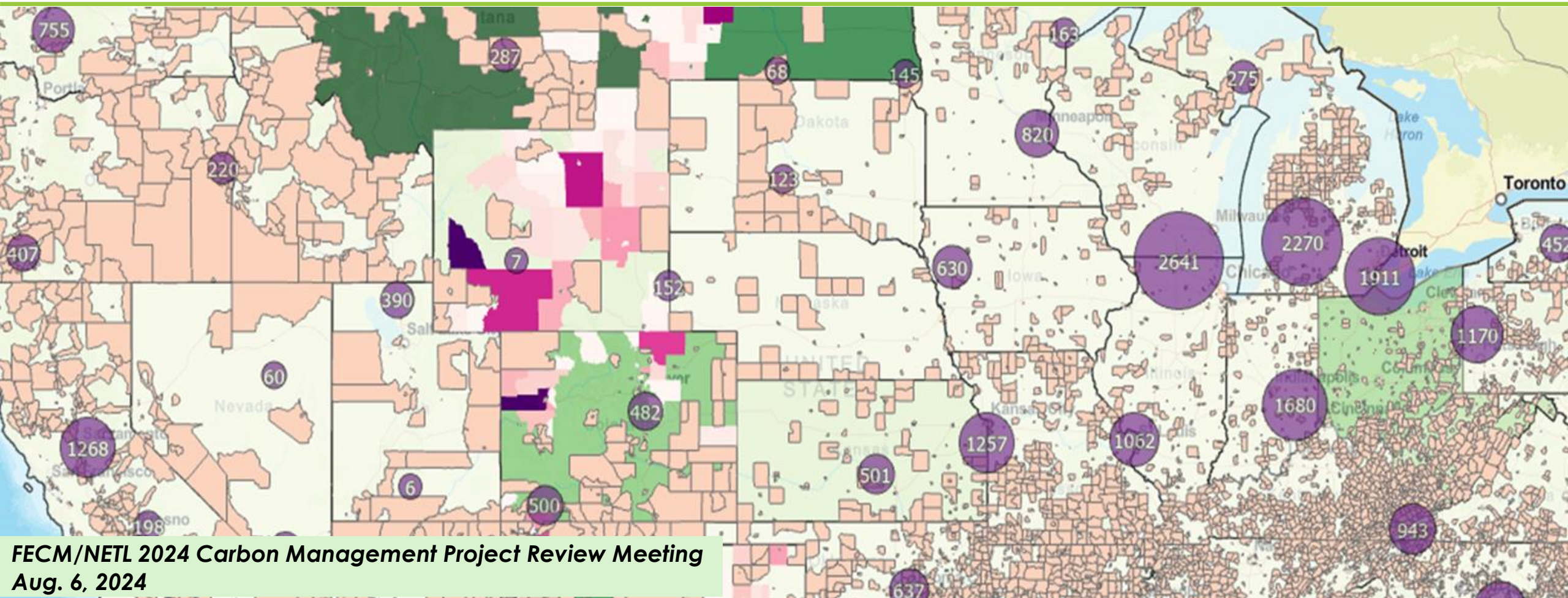


Dynamic CCS-EJ-SJ Database and Web Application - What's New



Maneesh Sharma

Geospatial Research Scientist/NETL Support Contractor



Disclaimer



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Environmental Justice (EJ) and Social Justice (SJ) for Carbon Capture and Storage (CCS) Systems



Challenge: Lack of information and insight available to better understand the viability of a CCS project's implementation based off existing EJ and SJ challenges, as well as overall community attitudes toward CCS

40% of the overall benefits of certain federal investments—including investments in **clean energy** and **energy efficiency**; clean transit; affordable and sustainable housing; training and workforce development; the remediation and reduction of legacy pollution; and the development of clean water infrastructure—must flow to **disadvantaged communities** (**Justice40 Initiative (EO 14008, Section 223)**)

Value:

- Provide decision and policy makers EJ-SJ insights on CCS feasibility
- Benefit techno-economic, environmental, and social analyses driving commercial, regulatory, and research supporting the CCS economy

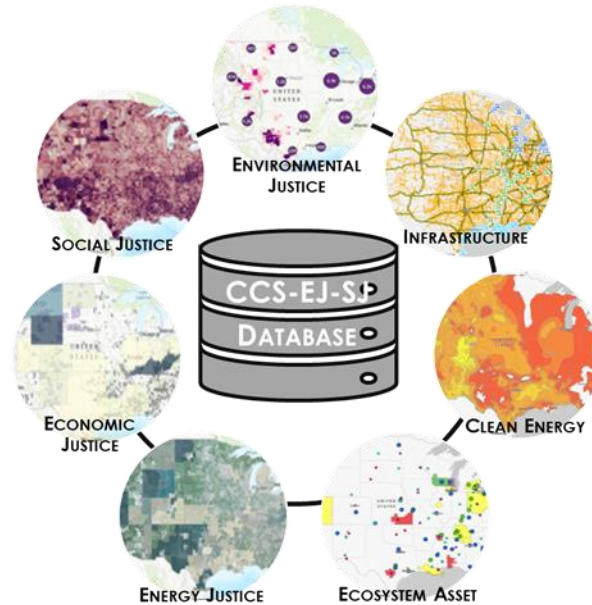
Objective:

- Identify EJ-SJ factors and resources for supporting assessments and calculating metrics
- Build a nationwide EJ-SJ database to support CCS implementation planning
- Develop an intuitive, interactive dashboard to provide data-driven insights into EJ-SJ opportunities for CCS activities

Ultimate Product:

- CCS-EJ-SJ database available for download on NETL's Energy Data Exchange (EDX) DisCO₂ver
- Interactive dashboard designed to support intuitive interaction with CCS-EJ-SJ data to support CCS project efficiency and improve understanding of EJ and SJ factors and how the factors may support or impact commercial, regulatory, and research applications

- CCS-EJ-SJ database showing data organization within major themes
- Available as file geodatabase from EDX

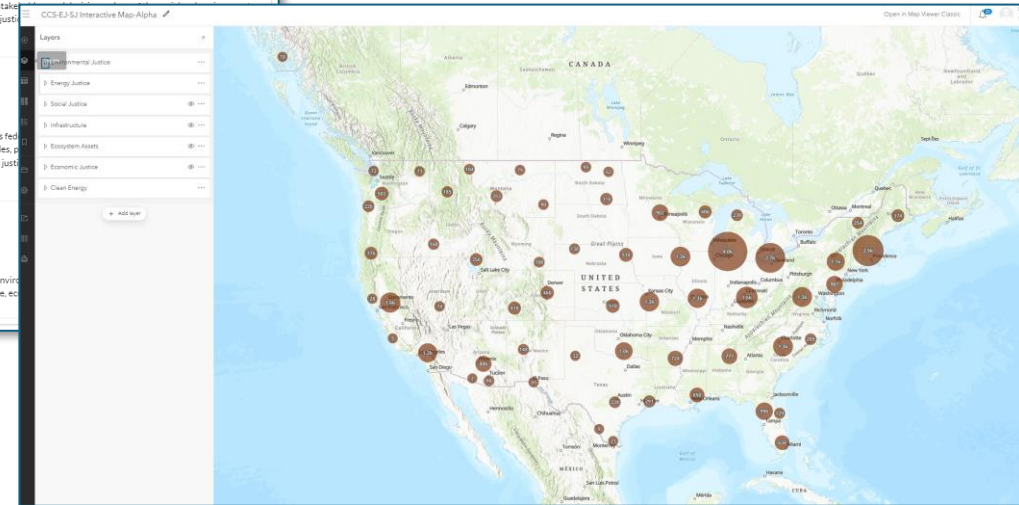
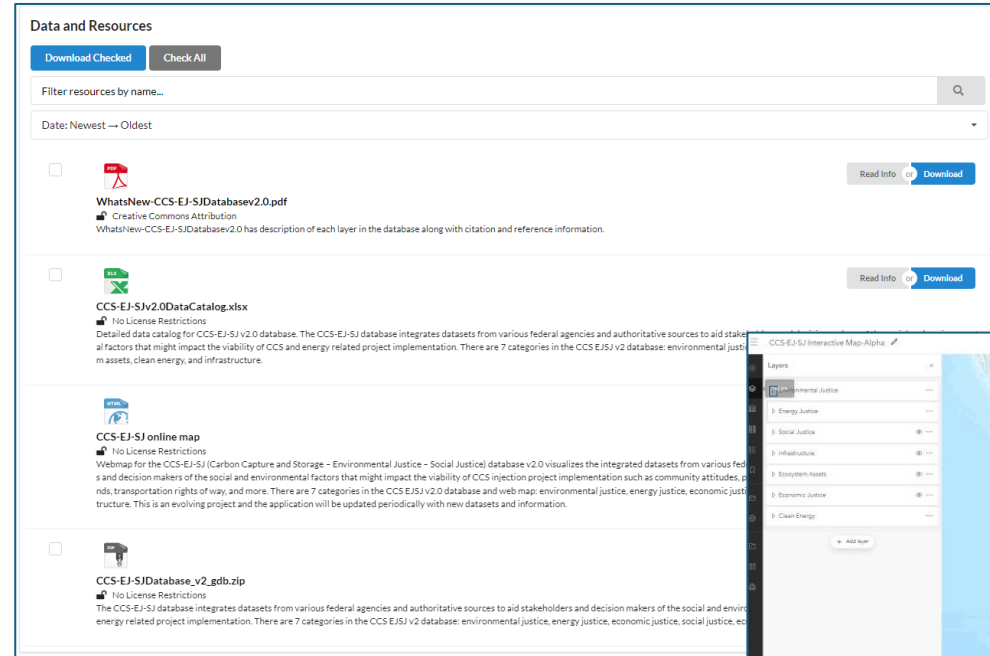


Data Aggregated from Various Authoritative Sources

Category	Datasets	Sources
Environmental Justice	28	ACS, CDC, EPA, FEMA, NLCD, U.S. Census
Social Justice	38	ACS, CDC, CEQ, EPA, HIFLD, HUD, NASA, U.S. Census
Energy Justice	27	ACS, DOE, EIA, Enverus, EPA, GCCSI, IBRD, NOAA, U.S. Census
Economic Justice	11	ACS, BEA, IWG, NETL, U.S. Census
Clean Energy	9	EIA, HIFLD, NAICS, NREL, ORNL
Ecosystem Assets	12	AMCC, EDA, EPA, DOE, MFG USA, NIST, NSF
Infrastructure	18	EIA, BTS, CEC, FAA, FCC, FRA, HIFLD, MSI, MSHA, NETL, U.S. Census, USDOT, USGS
	148 datasets	

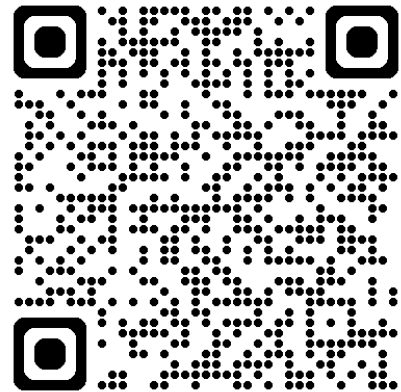
EJ and SJ for CCS Systems

- CCS-EJ-SJ information hosted on EDX
- EDX site includes
 - What's New
 - Data Catalog
 - Database
 - Interactive Online Map



Types of EJ-SJ information and metrics available in version 2 of the CCS-EJ-SJ Database (Sharma et al., 2024; <https://edx.netl.doe.gov/dataset/ccs-ej-sj-database>)

Interactive Online Map

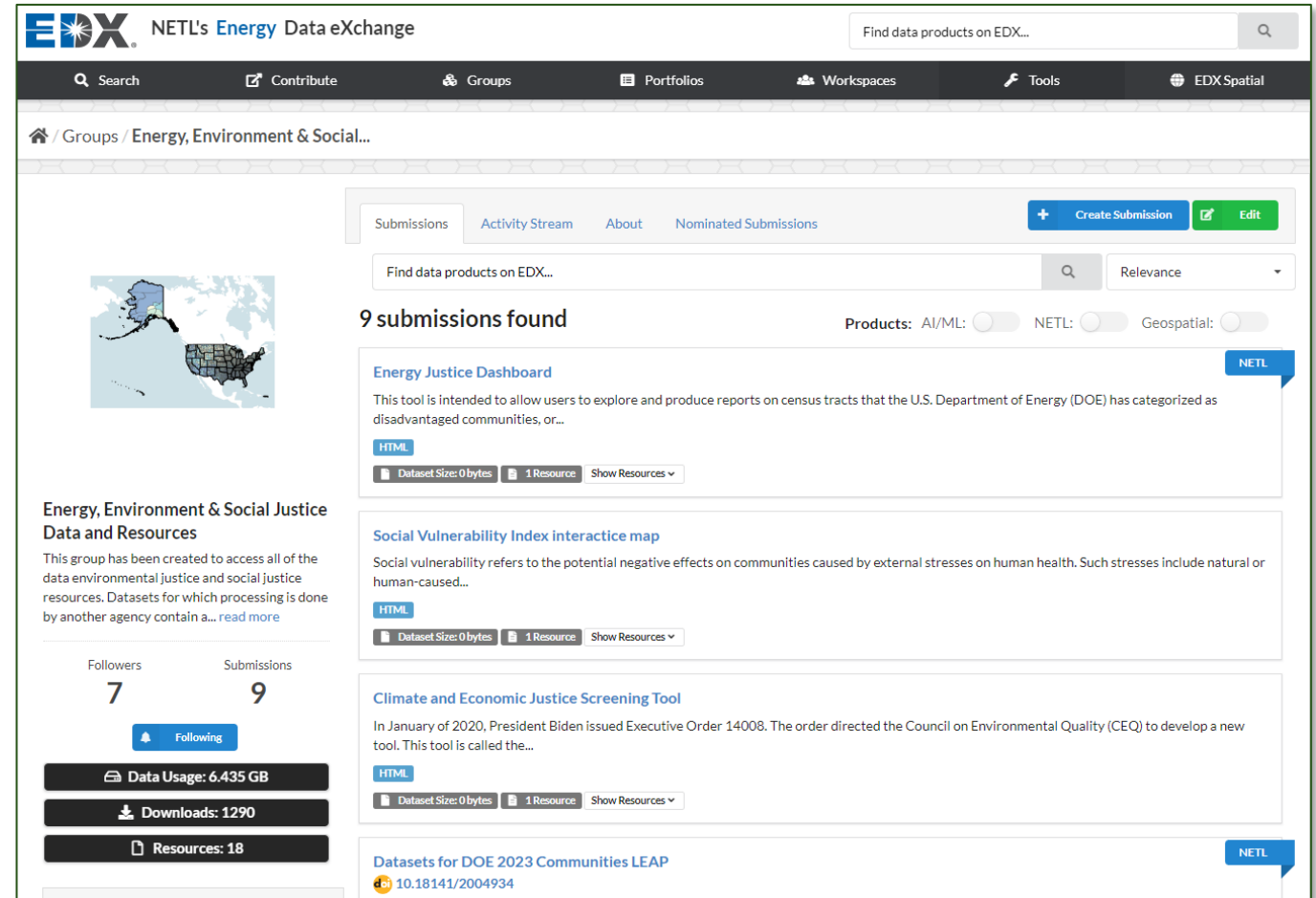
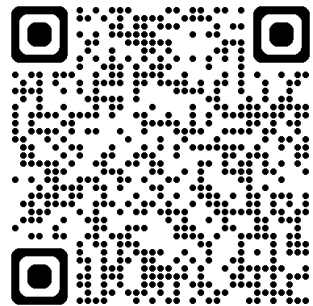


Energy Data Exchange (EDX)



A web-hosted, virtual library and laboratory that supports the public and the NETL community

Central location for EJ-SJ related information [Energy, Environment & Social Justice Data and Resources - Groups - EDX \(doe.gov\)](#)



Community Attitude Toward CCS

Purpose

This analysis aims to capture sentiment toward topics in CCS using text data extracted from news articles, community forums, and social platforms.

1. Spatial Patterns

- How does sentiment toward CCS vary by geography, and what regional differences can be identified?

2. Word Association

- What topics, terms, and phrases are primary drivers of sentiment scores, and how do they influence public perception?

3. Public Concerns and Support

- What are the main concerns and areas of support among communities regarding CCS projects?

4. Media Influence

- How does media coverage affect sentiment and public discourse on CCS?

5. Future Trends

- What emerging trends can be identified in public sentiment toward CCS?

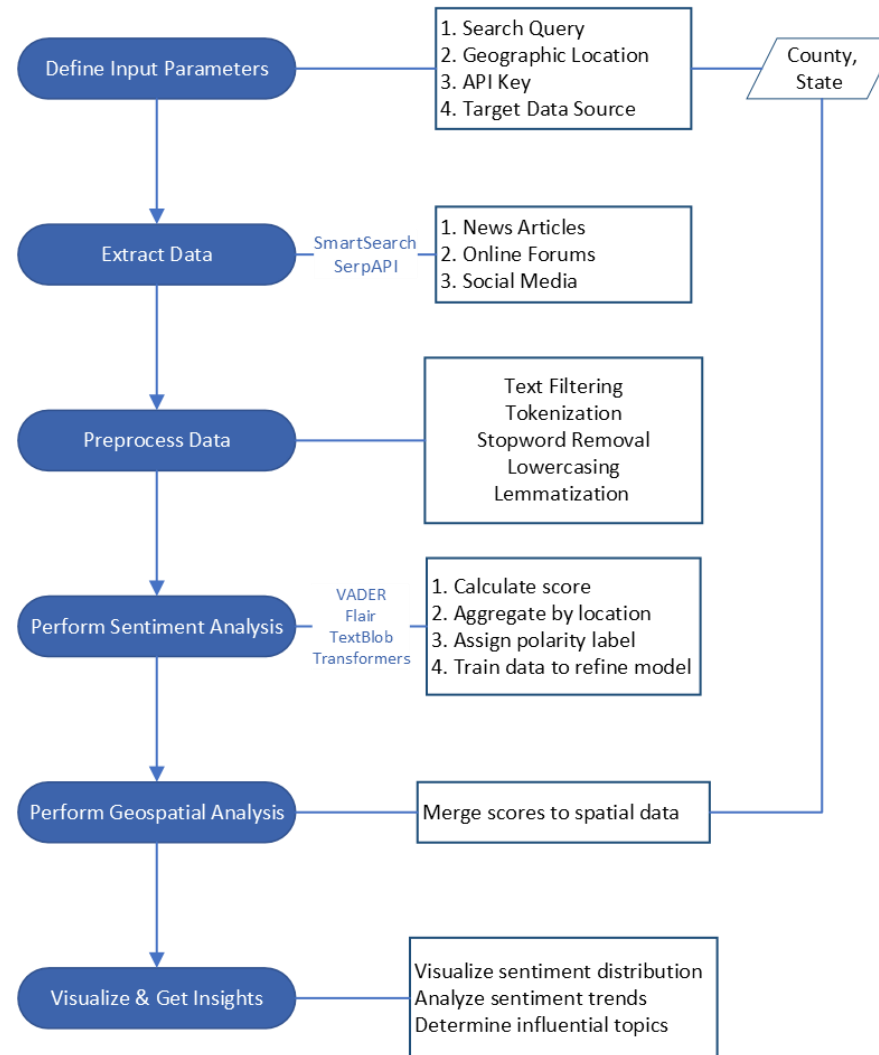
Community Attitude Toward CCS

Workflow

- Key factor is defining input parameters with geographic information search

- Processing of data leading to sentiment analysis. Focus is on Vader and Transformers

- Geospatial output for analysis



Poster Session



DEMO & POSTER SESSION

TUESDAY, AUGUST 6, 2024
5:45 PM - 7:45PM
BALLROOM GALLERY

Community Sentiment Analysis with Focus on CCS



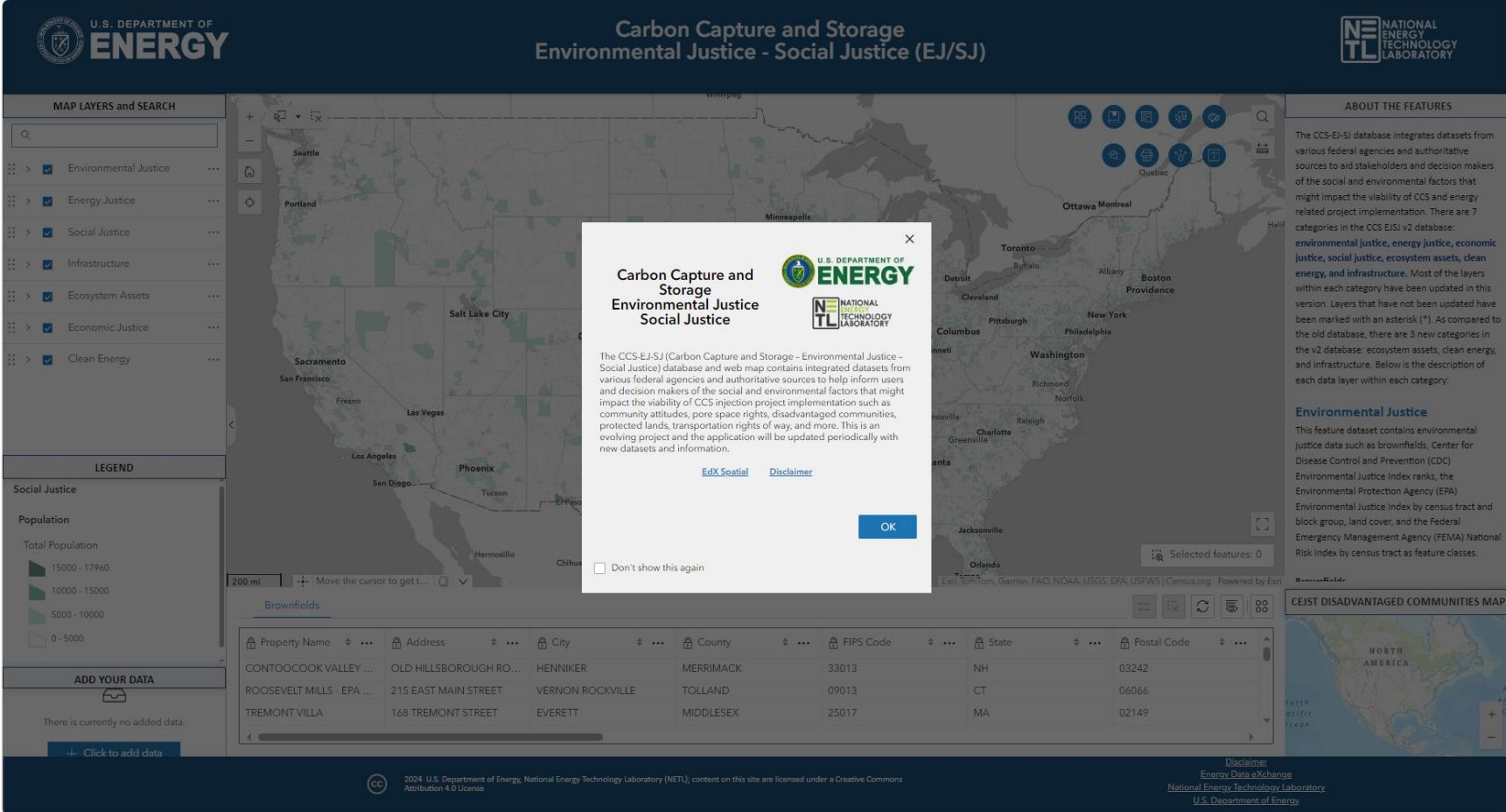
CARBON TRANSPORT & STORAGE DATA AND
INNOVATION TO BRIDGE THE DIGITAL DIVIDE



CCS-EJ-SJ Interactive Web Application

Welcome/Informational Screen

- CCS-EJ-SJ web application is being built using the developer's version of ESRI's Experience Builder
- Goal is to provide the stakeholder a central place for authoritative data
- Users/stakeholders can interact with data and print a custom report



Carbon Capture and Storage Environmental Justice - Social Justice (EJ/SJ)

The CCS-EJ-SJ (Carbon Capture and Storage - Environmental Justice - Social Justice) database and web map contains integrated datasets from various federal agencies and authoritative sources to help inform users and decision makers of the social and environmental factors that might impact the viability of CCS injection project implementation such as community attitudes, pore space rights, disadvantaged communities, protected lands, transportation rights of way, and more. This is an evolving project and the application will be updated periodically with new datasets and information.

[EdX Spatial](#) [Disclaimer](#)

Property Name	Address	City	County	FIPS Code	State	Postal Code
CONTOOCOOK VALLEY ...	OLD HILLSBOROUGH RO...	HENNIKER	MERRIMACK	33013	NH	03242
ROOSEVELT MILLS - EPA ...	215 EAST MAIN STREET	VERNON ROCKVILLE	TOLLAND	09013	CT	06066
TREMONT VILLA	168 TREMONT STREET	EVERETT	MIDDLESEX	25017	MA	02149

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Energy Data eXchange
National Energy Technology Laboratory
U.S. Department of Energy

CCS-EJ-SJ Interactive Web Application

Main Application

Map Layers and General Search

Map Legend of Active Layers

Add Your Own Data!

U.S. DEPARTMENT OF ENERGY
Carbon Capture and Storage
Environmental Justice - Social Justice (EJ/SJ)

MAP LAYERS and SEARCH

Environmental Justice
Energy Justice
Social Justice
Infrastructure
Ecosystem Assets
Economic Justice
Clean Energy

LEGEND

Social Justice

Population

Total Population

- 15000 - 17960
- 10000 - 15000
- 5000 - 10000
- 0 - 5000

ADD YOUR DATA

There is currently no added data.

+ Click to add data

Tools

Right Column Info (pulls dynamically from layers)

Percent Total Population 35 to 44 Years	Percent Total Population 45 to 54 Years	Percent Total Population 55 to 59 Years	Percent Total Population 60 to 64 Years	Percent Total Population 65 to 69 Years
13.1	7.7	11.5	16.3	
11.7	7.2	8.9	11.5	
7.4	12.4	8.3	6.3	

ABOUT THE FEATURES

The CCS-EJ-SJ database integrates datasets from various federal agencies and authoritative sources to aid stakeholders and decision makers of the social and environmental factors that might impact the viability of CCS and energy related project implementation. There are 7 categories in the CCS EJ/SJ v2 database: environmental justice, energy justice, economic justice, social justice, ecosystem assets, clean energy, and infrastructure. Most of the layers within each category have been updated in this version. Layers that have not been updated have been marked with an asterisk (*). As compared to the old database, there are 3 new categories in the v2 database: ecosystem assets, clean energy and infrastructure. Below is the description of each data layer within each category:

Environmental Justice

This feature dataset contains environmental justice data such as brownfields, CDC Disease Control and Prevention (CDC) Environmental Justice Index ranks, the Environmental Protection Agency (EPA) Environmental Justice Index by census tract and block group, land cover, and the Federal Emergency Management Agency (FEMA) National Risk Index by census tract as feature classes.

CEJST DISADVANTAGED COMMUNITIES MAP

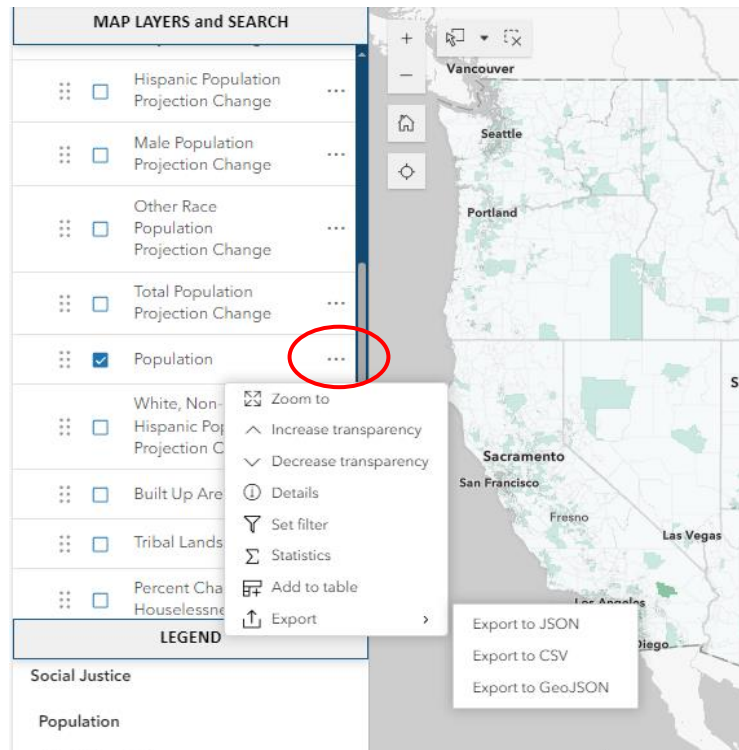
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National Energy Technology Laboratory
U.S. Department of Energy

CCS-EJ-SJ Interactive Web Application

Layers: Associated Tools

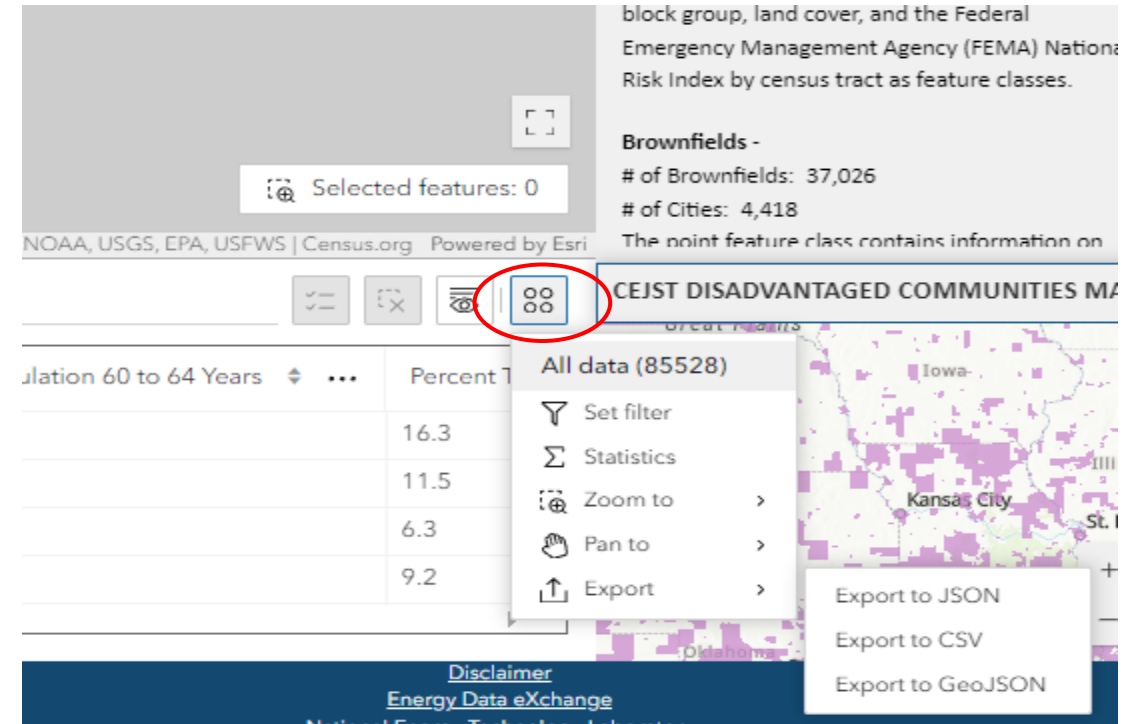
Get from Map Layers:

Click on the icon (circled) to access tools via Map Layers: Zooming, Transparency, Layer Details, Filter Data, Generate Statistics, View Attribute Data in Attribute Table, Export Data (as JSON, CSV, GeoJSON; geospatial files planned for Ver. 2)



Get from Attribute Table:

Click on the icon (circled) to access tools via the Attribute Table: Filter Data, Generate Statistics, Zooming, Pan to Data in the Map, Export Data (as JSON, CSV, GeoJSON; geospatial files (upcoming)



CCS-EJ-SJ Interactive Web Application

Grouped Layers: Environmental and Energy Justice

Expanded

- Environmental Justice
- Brownfields
- CDC Environmental Justice Index Ranks
- EPA Environmental Justice Screen Blockgroup
- EPA Environmental Justice Screen Tracts
- National Risk Index
- Land Cover

MAP LAYERS and SEARCH

- Environmental Justice
- Energy Justice
- Social Justice
- Infrastructure
- Ecosystem Assets
- Economic Justice
- Clean Energy

Expanded

- Energy Justice
 - Pore Space Rights
 - Oil and Gas Flaring In Production
 - USA Oil and Gas Flaring
 - USA Oil and Gas Flaring Tracts
 - DOE Disadvantaged Communities
 - Coal Production by State

CCS-EJ-SJ Interactive Web Application

Tools: The Toolbar

More tools are planned for Version 2.



Choose your own base (background) map.



Bookmark your areas of interest and return to them (in a viewing session).



Query layers (in development).



Spatially select layers (in development).



Draw and Measure Tool. Place a point, draw lines, draw polygons. Turn on measure to get a point location, length of a line, square miles within a polygon



Analysis Tool. (Further development. This tool will be incorporated into other tools.)



Standard Print Tool. In version 2, this will be replaced with a customized print and report tool.



Sharing Tool. Share the map via social media or email.



Informational Tool. General information on the map application itself. This tool is in development.

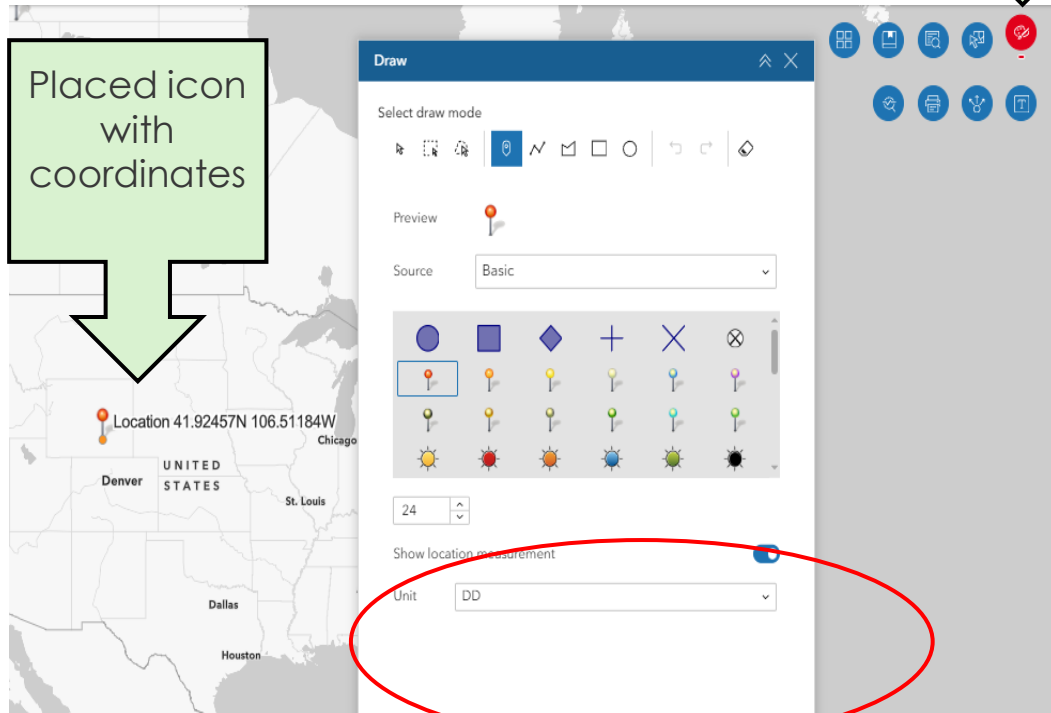
CCS-EJ-SJ Interactive Web Application

Tool Example: The Draw and Measure Tool

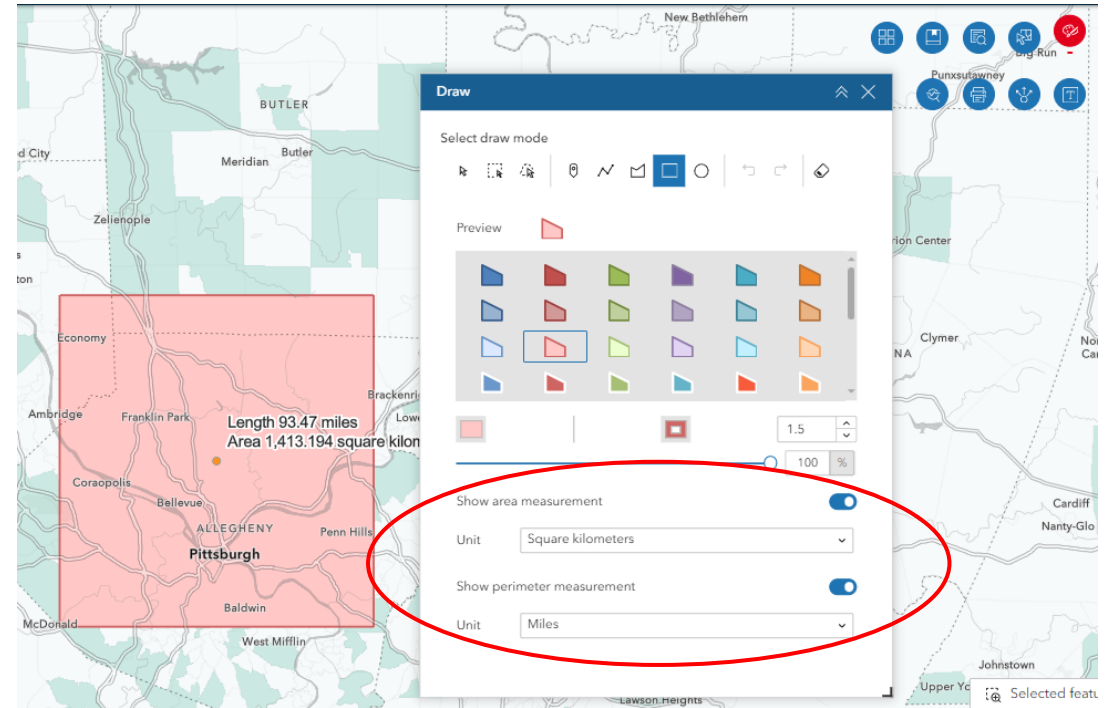
The Draw and Measure Tool for a point with "Show location measurement" turned on.

Active Tool

Placed icon with coordinates



The Draw and Measure Tool for a polygon with "Show location measurement" turned on for both area measurement and perimeter measurement.



CCS-EJ-SJ Interactive Web Application

Tool Example: The Add Data Tool

Example of using an exterior web service (REST). Below, an "All Mining" layer is added from the West Virginia Geological and Economic Survey. https://atlas.wvgs.wvnet.edu/arcgis/rest/services/Coal_Web_Mercator/All_Mining_WM/FeatureServer

You can also add your own: Shapefiles, CSV, KML, GeoJSON, GPX.

LEGEND

Social Justice

Population

Total Population

- 15000 - 17960
- 10000 - 15000
- 5000 - 10000
- 0 - 5000

ADD YOUR DATA

There is currently no added data.

+ Click to add data

Add data

Search **URL** File

Type

ArcGIS Server Web Serv...

URL

https://atlas.wvgs.wvnet.edu/arcgis/rest/services/Coal_Web_Mercator/All_Mining_WM/FeatureServer

Add

Sample URL

https://services.arcgis.com/P3ePLMYs2RVChkIj/arcgis/rest/services/World_Cities/FeatureServer/0

Legend

- All_Mining_WM
- Underground Mining Labels
- Underground Mining
- Surface Mining

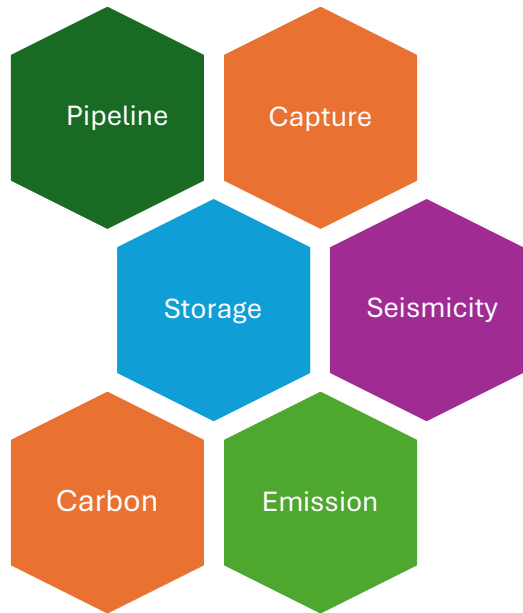
ADD YOUR DATA

All_Mining_WM

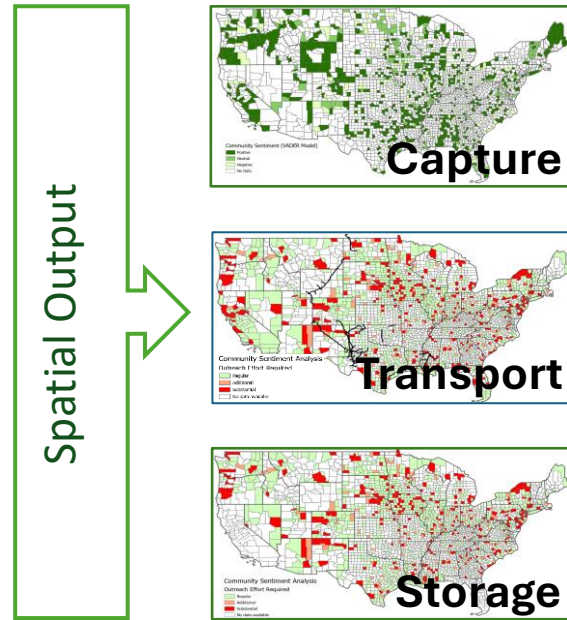
Property Name	Address	City	County	FIPS Code
CONTOOCOOK VALLEY ...	OLD HILLSBOROUGH RO...	HENNIKER	MERRIMACK	33013
ROOSEVELT MILLS - EPA ...	215 EAST MAIN STREET	VERNON ROCKVILLE	TOLLAND	09013
TREMONT VILLA	168 TREMONT STREET	EVERETT	MIDDLESEX	25017
ALDEN CORRUGATED	1 CHURCH STREET	NEW BEDFORD	BRISTOL	25005

CCS-EJ-SJ Coming Updates

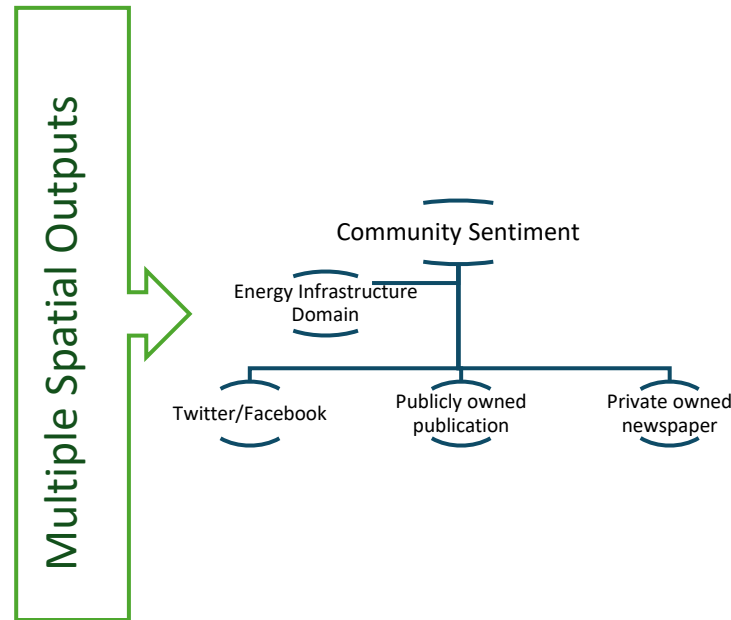
Community Sentiment on Energy Infrastructure



Energy infrastructure domain.

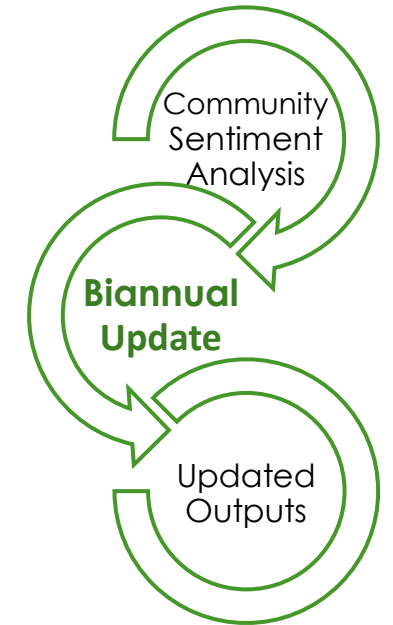


Sentiment analysis spatial outputs by domain.



Optional: Detailed Analysis of sentiment analysis output.

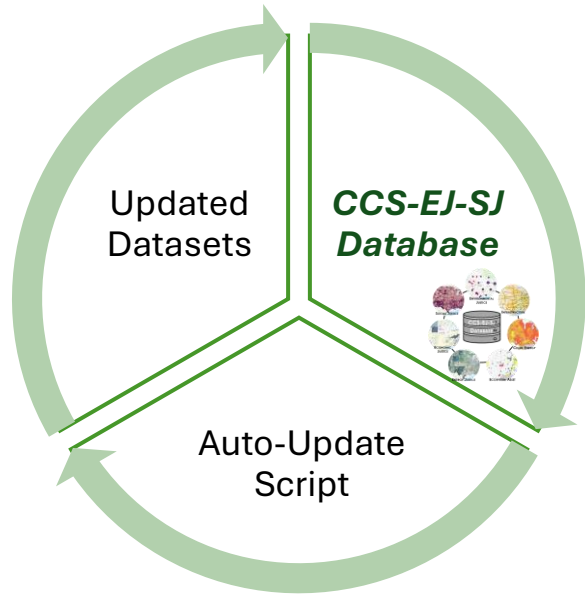
Update Frequency



Sentiment analysis update.

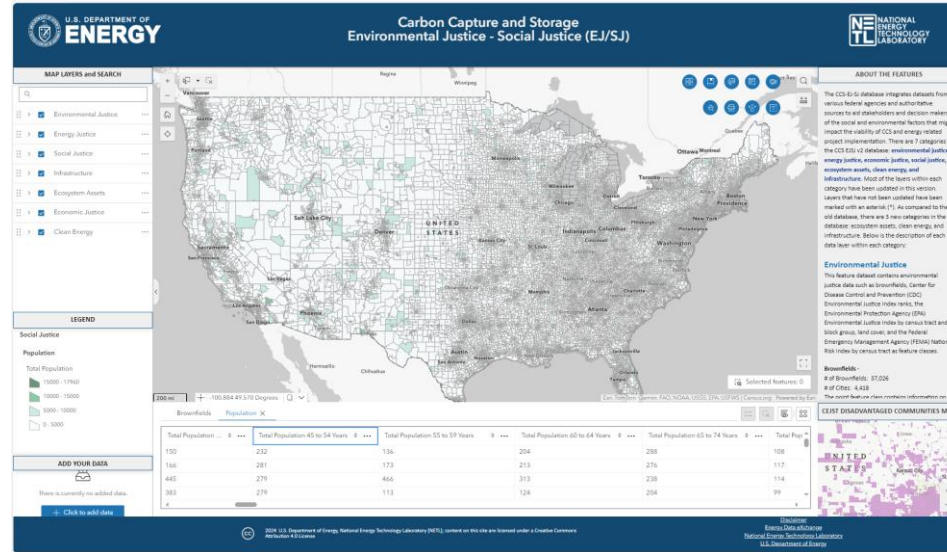
CCS-EJ-SJ Coming Updates

Script- Auto Update Database



Auto-Update Script for various data sources.

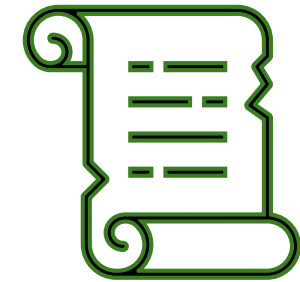
Web Application



Create Dashboard - Advanced functionality; including support for advanced data queries and output of stylized reports.

<https://edx.netl.doe.gov/dataset/ccs-ej-sj-database>

Manuscript



Draft manuscript-community sentiment analysis models, model outputs and results.



Integrate data and dashboard into EDX DisCO₂ver Platform for user access.

Demo Session



DEMO & POSTER SESSION

TUESDAY, AUGUST 6, 2024
5:45 PM - 7:45PM
BALLROOM GALLERY

Dynamic CCS-EJ-SJ Database and Web Application - What's New



CARBON TRANSPORT & STORAGE DATA AND
INNOVATION TO BRIDGE THE DIGITAL DIVIDE



Acknowledgments



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