Carbon Storage Planning Inquiry Tool (CS PlanIT)

Providing Data and Insights for Accelerating Carbon Transport & Storage Deployment

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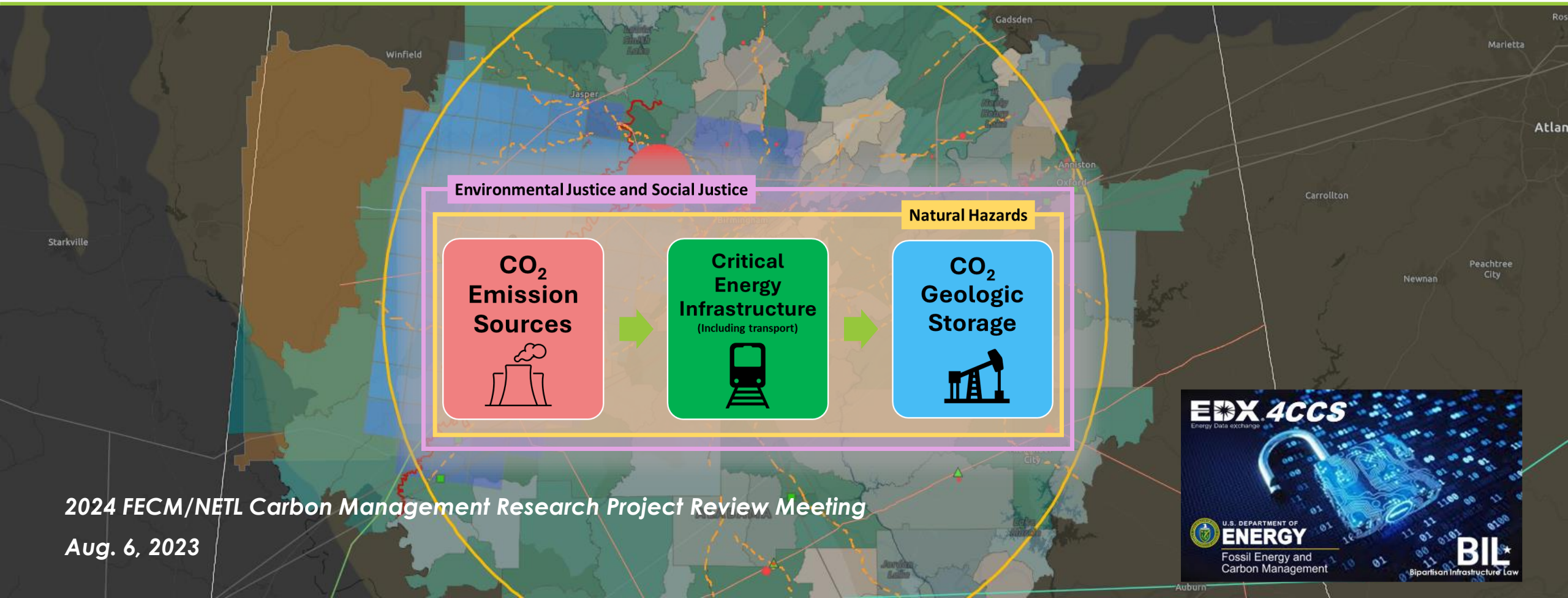

2024 FECM/NETL Carbon Management Research Project Review Meeting

Aug. 6, 2023

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Carbon Storage Planning Inquiry Tool (CS PlanIT) v1.0

Overview

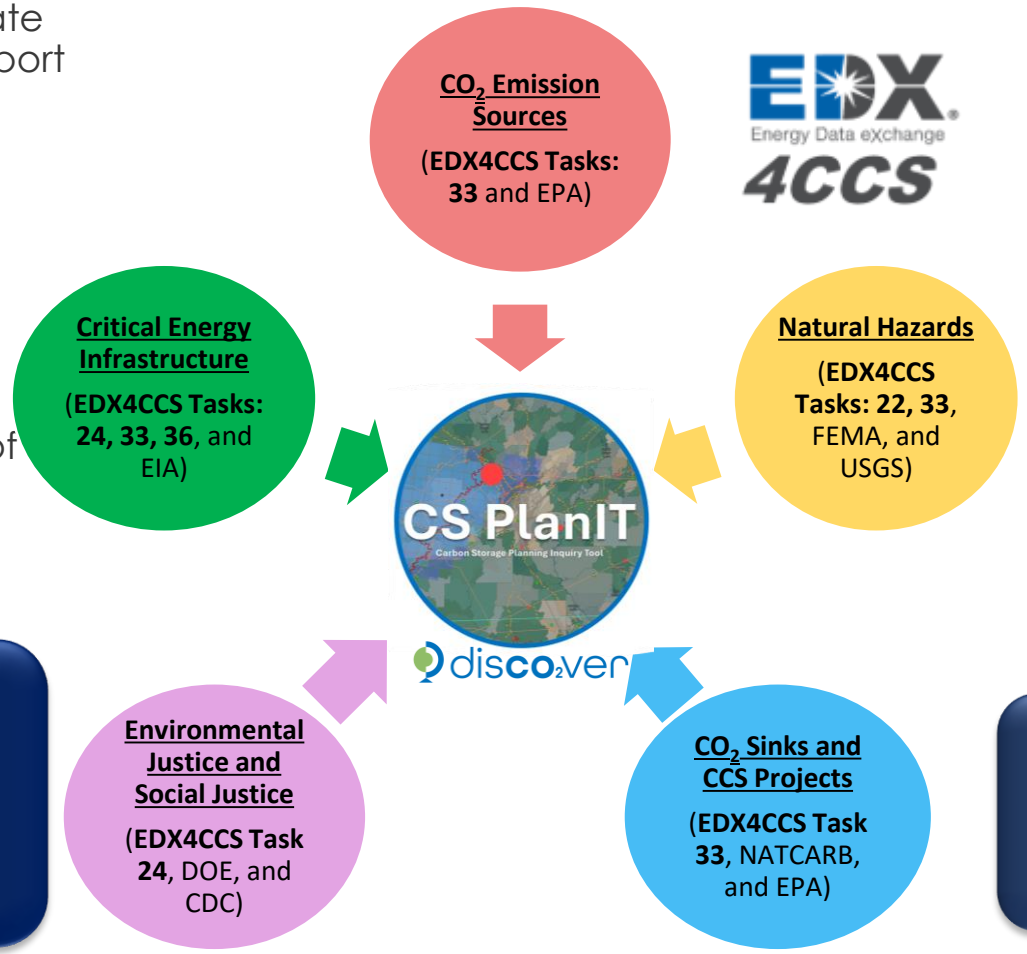
Purpose:

- Provides easy access to explore, query, and evaluate multiple data layers to support and accelerate carbon storage resource feasibility assessments and planning efforts

Problem:

- CS planning requires the consideration of multiple factors linked to a variety of disparate, multi-sourced datasets that require integration

Data Types
(Data Source)



EDX- Energy Data eXchange
CCS- Carbon Capture and Storage
DOE- Department of Energy
USGS- United States Geological Survey
FEMA- Federal Emergency Management Administration
EPA- Environmental Protection Agency
EIA- Energy Information Administration
CDC- Center for Disease Control
NATCARB- National Carbon Sequestration Database

User community:

- Potential stakeholders include well/plant operators, policy makers, researchers, public communities

Potential insights for a given area…

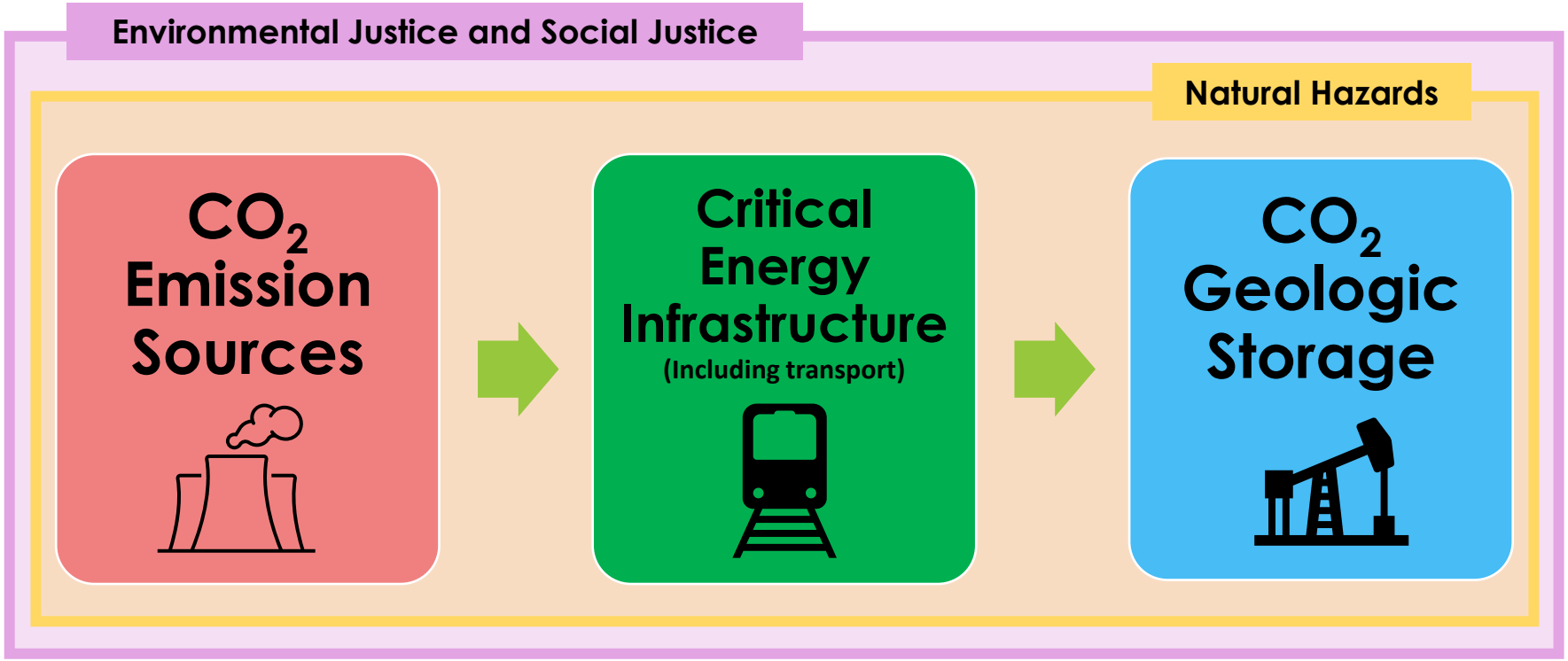
- What are the population/community impacts?
- What are the potential natural hazards?
- What are the CO_2 emissions sources and amounts?
- Are there candidate infrastructure for reuse?
- Are there potential CO_2 reservoirs?
- What are current storage estimates?
- What are the current carbon storage projects?

- **CS PlanIT v1.0 publicly accessible via EDX 6/30**
- **Continuing work through EY24- incorporating data from EDX4CCS task 21**
- **Ultimately to be deployed on EDX DisCO_2ver**

Carbon Storage Planning Inquiry Tool (CS PlanIT) v1.0

Design Focus

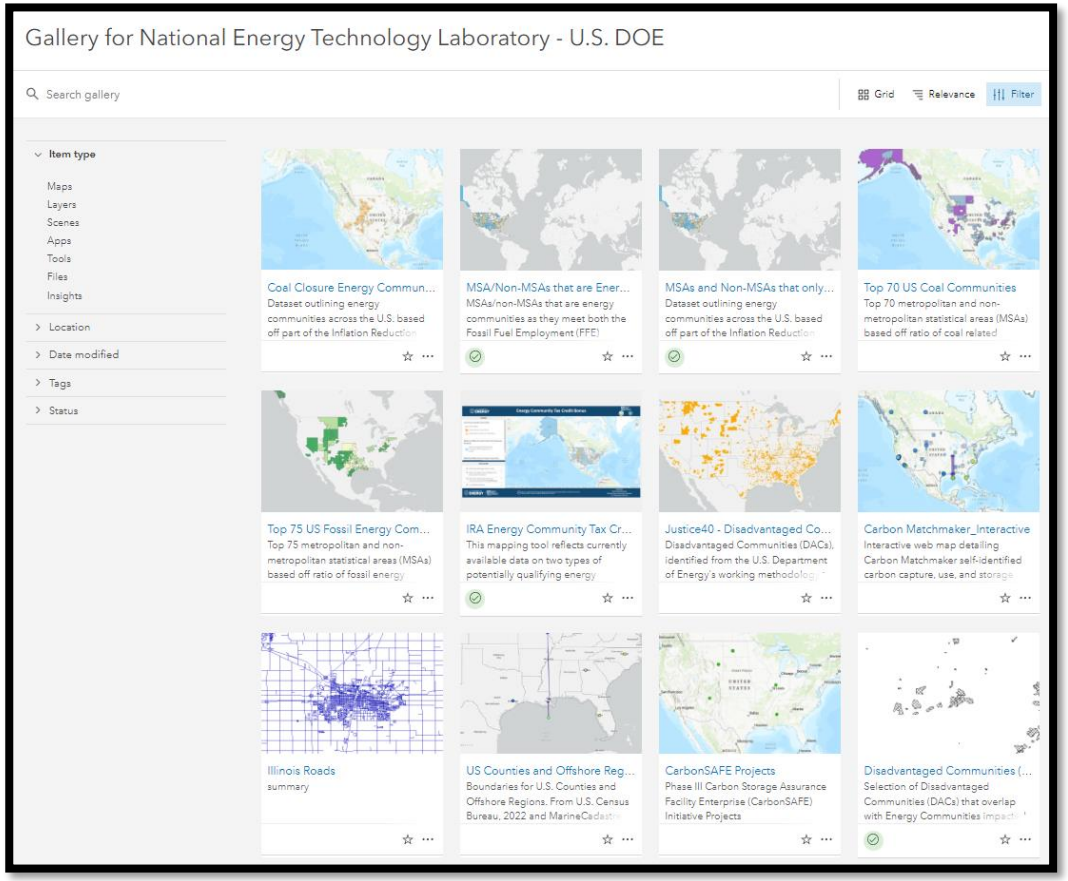
- The goal of reaching large-scale CS deployment starts with informed planning
- Discover and acquire publicly available data for each stage of the CCS supply chain (Source -> Critical Energy Infrastructure -> Storage)
- Evaluate impact on the community and environment at each stage in the CCS supply chain



Carbon Storage Planning Inquiry Tool (CS PlanIT) v1.0

Approach

- Identified the need for a user-defined, radial-based query functionality
  - Leverage ArcGIS Enterprise web applications
- Identified, prioritized, and cataloged priority datasets across the EDX4CCS and other CS data research most relevant to CS planned efforts
  - Incorporated data services where possible to streamline data updates
- Designed the layout, functionality, and documentation of the dashboard to be user-friendly



Example data, tools, application on NETL's ArcGIS Enterprise platform.

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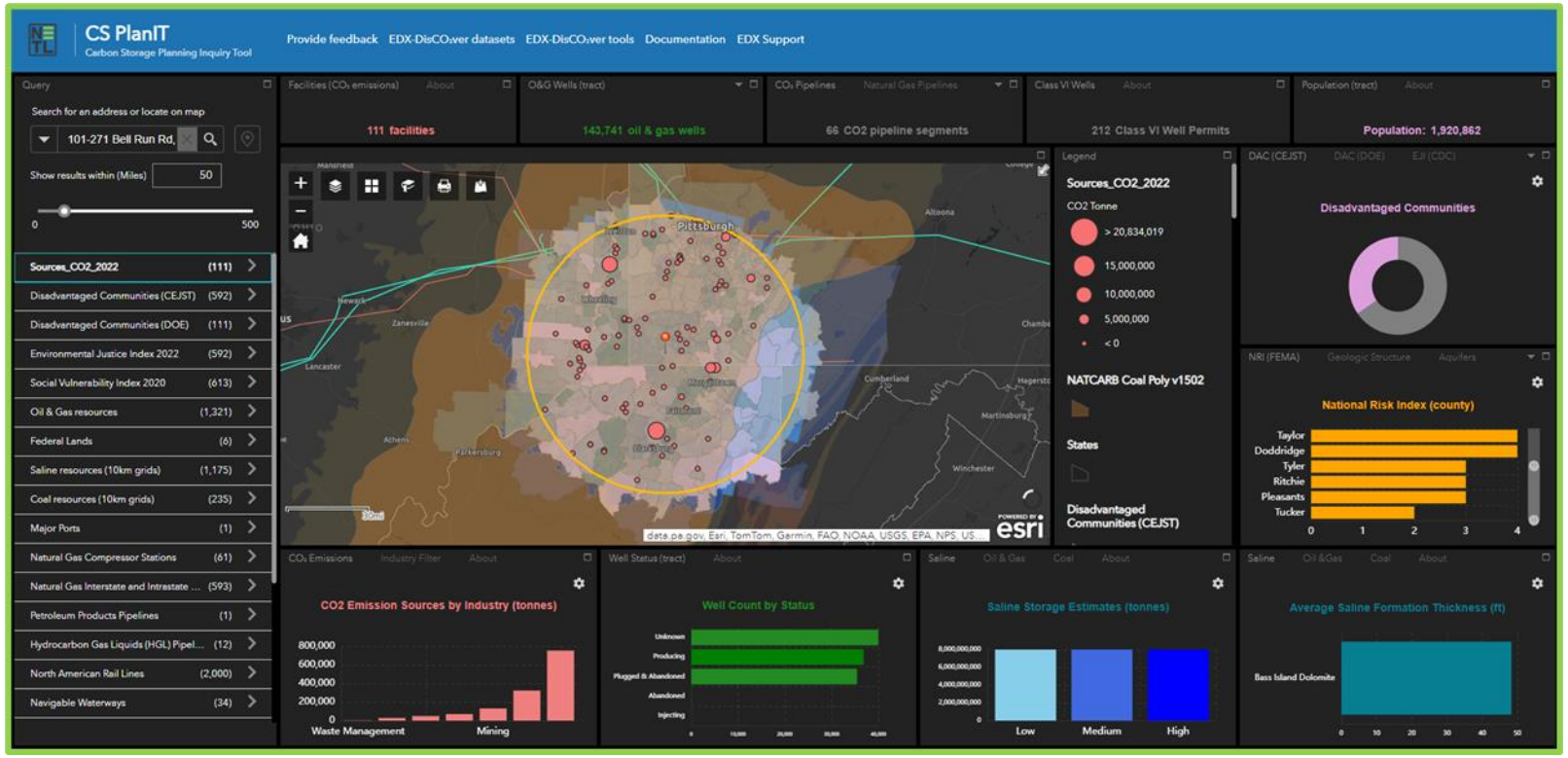
Accomplishments to Date

- Identified, cataloged, integrated **~40 datasets** across the EDX4CCS & CS data portfolios
- Organized data/stats into key categories:
  - Carbon dioxide (CO_2) emission sources
  - Critical energy infrastructure
  - CO_2 sinks/CCS (Carbon Capture & Storage) projects
  - Natural hazards
  - Environmental & Social Justice
- Successfully developed and tested the **Alpha and Beta versions** (Year 1 and 2, respectively) of CS PlanIT
- **Public release of CS PlanIT** on the EDX (Energy Data eXchange) by **6/30/2024**

CS PlanIT v1.0



Example spatial data query within CS PlanIT, yellow circle on map represents user defined area of interest.

https://edx.netl.doe.gov/dataset/cs-planit-carbon-storage-planning-inquiry-tool

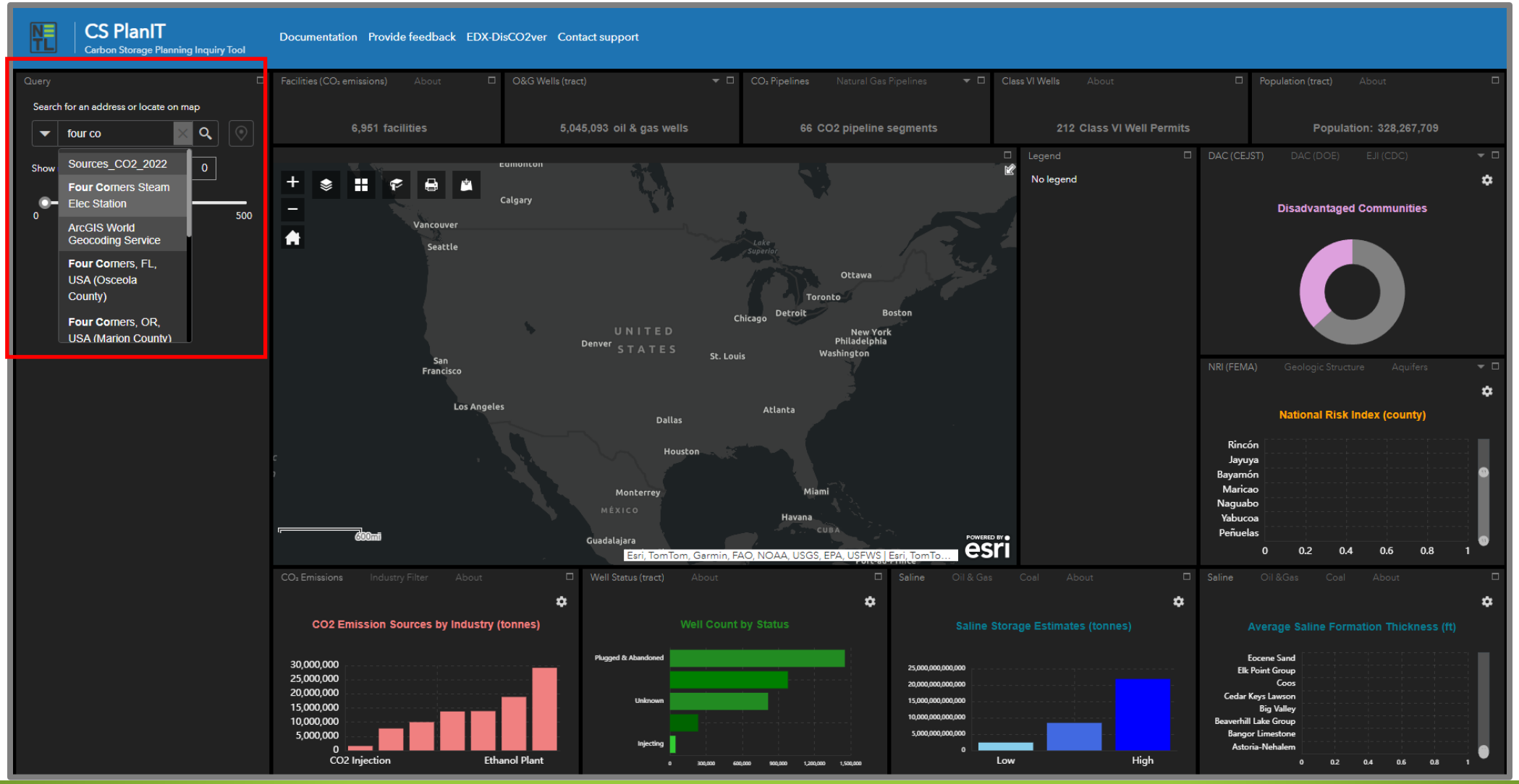
Carbon Storage Planning Inquiry Tool (CS PlanIT) v1.0

General Layout

- Data querying/filtering
- Charts and statistics
- Map and legend
- External links

Carbon Storage Planning Inquiry Tool (CS PlanIT) v1.0

Walkthrough - Query Location



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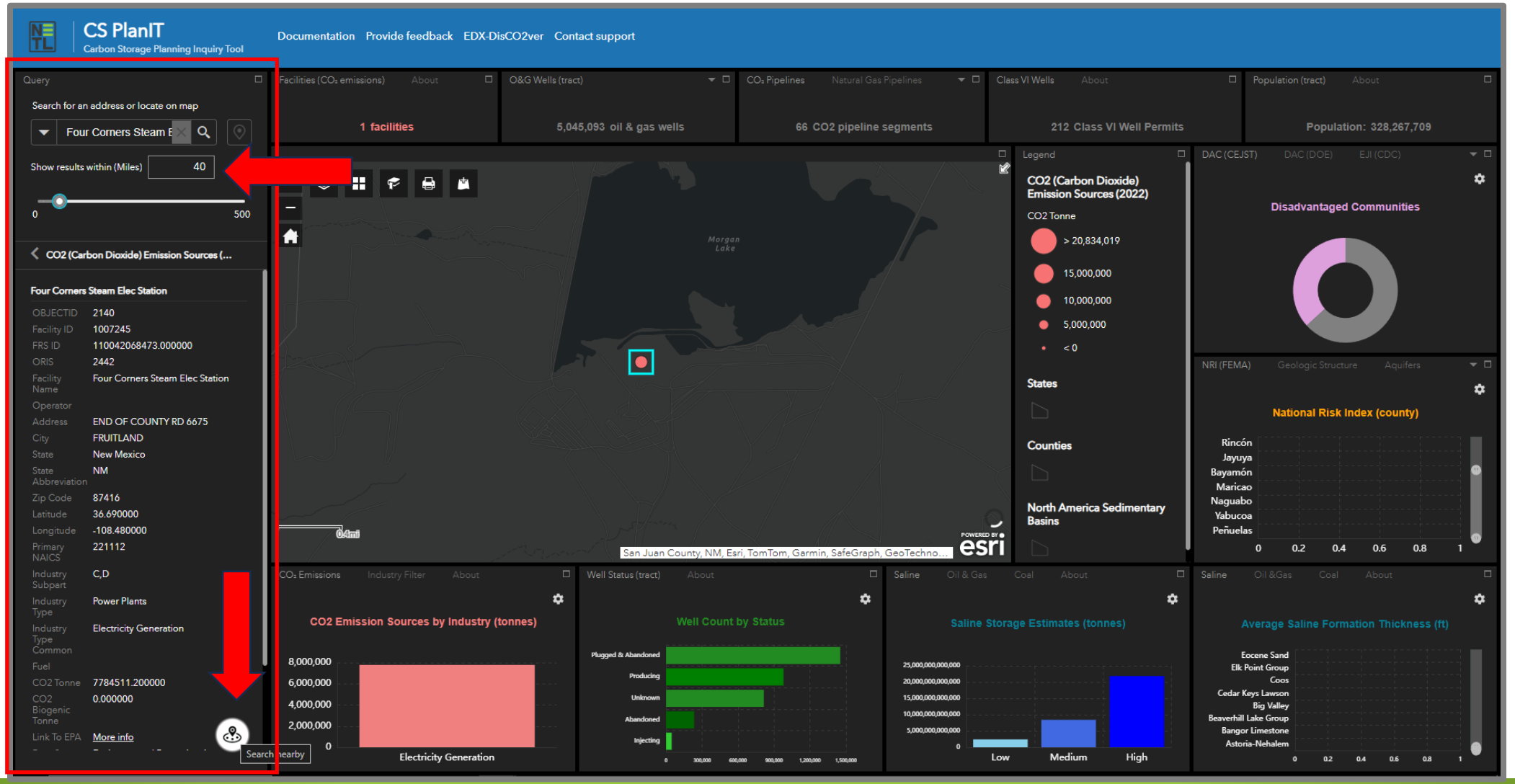
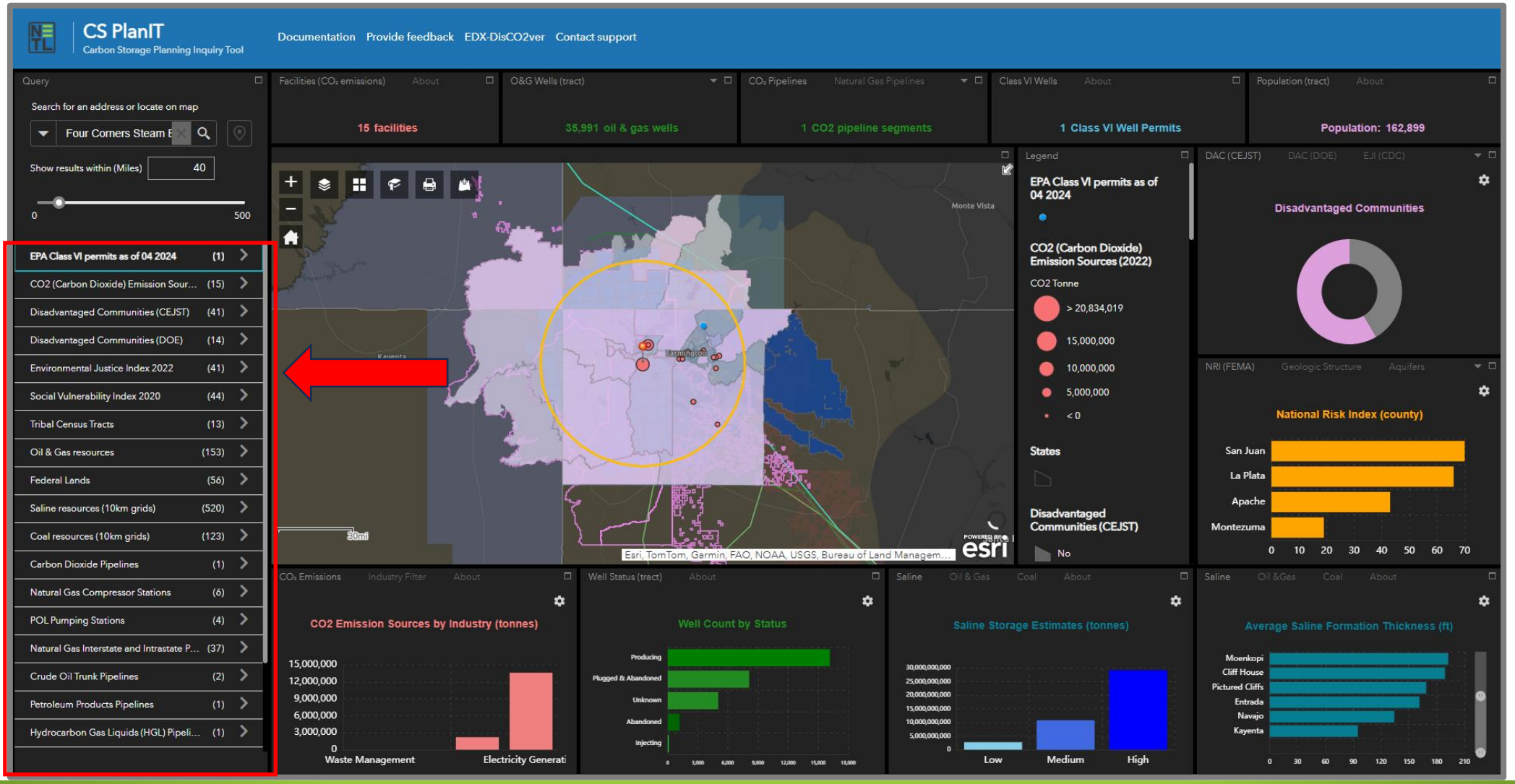
Walkthrough - Query Location



Carbon Storage Planning Inquiry Tool (CS PlanIT) v1.0

Walkthrough - Charts and Statistics



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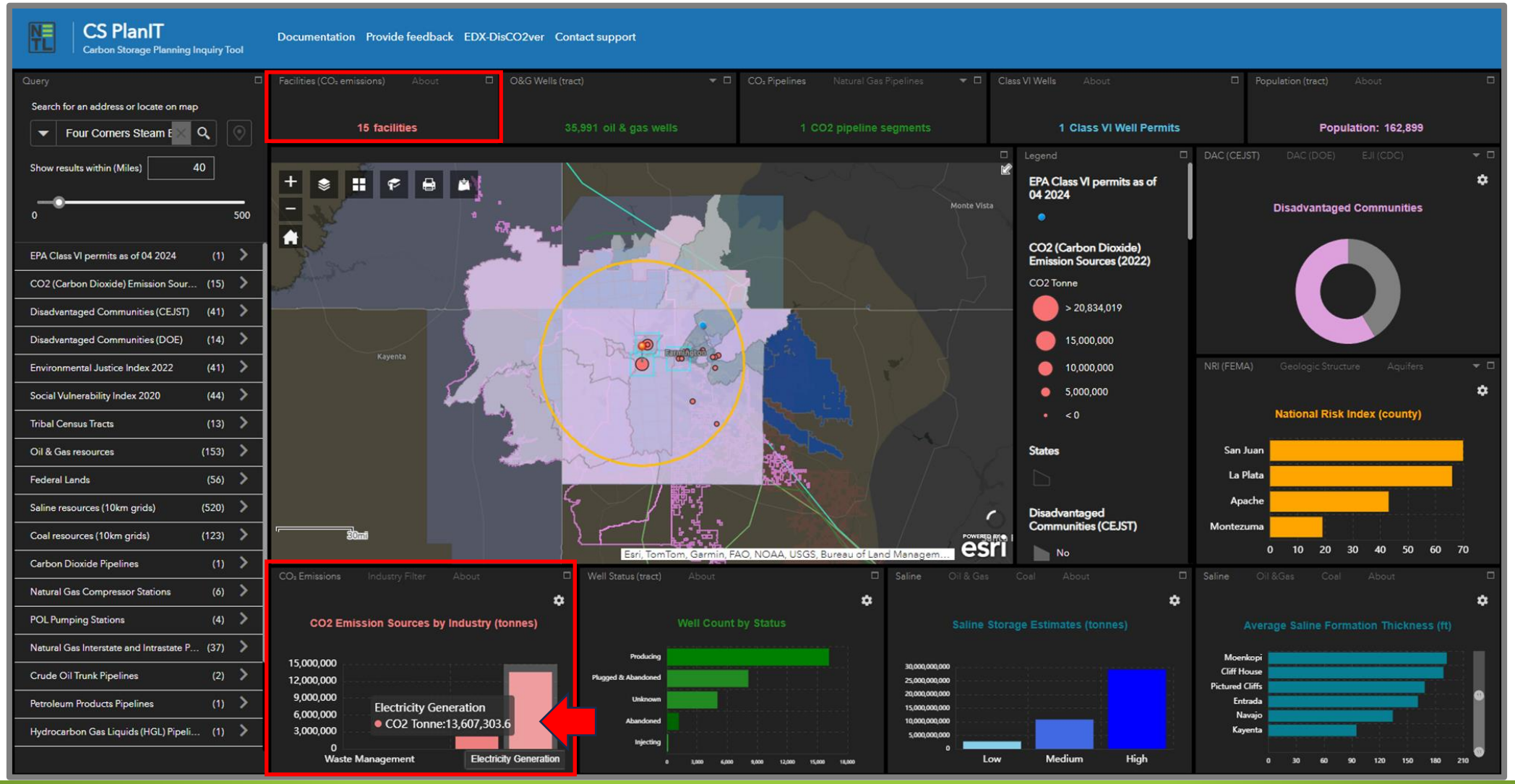
Walkthrough - Charts and Statistics



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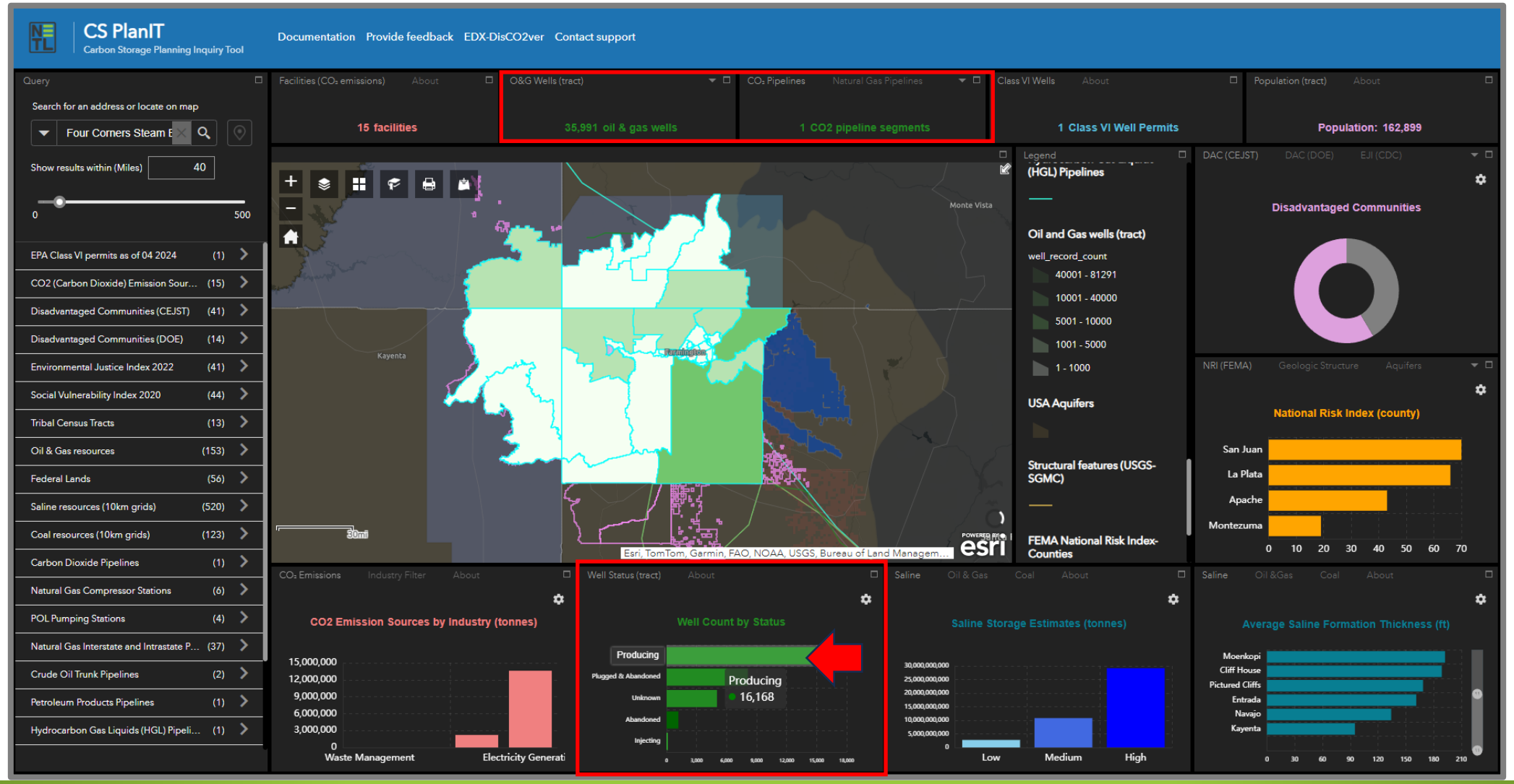
Walkthrough - Charts and Statistics



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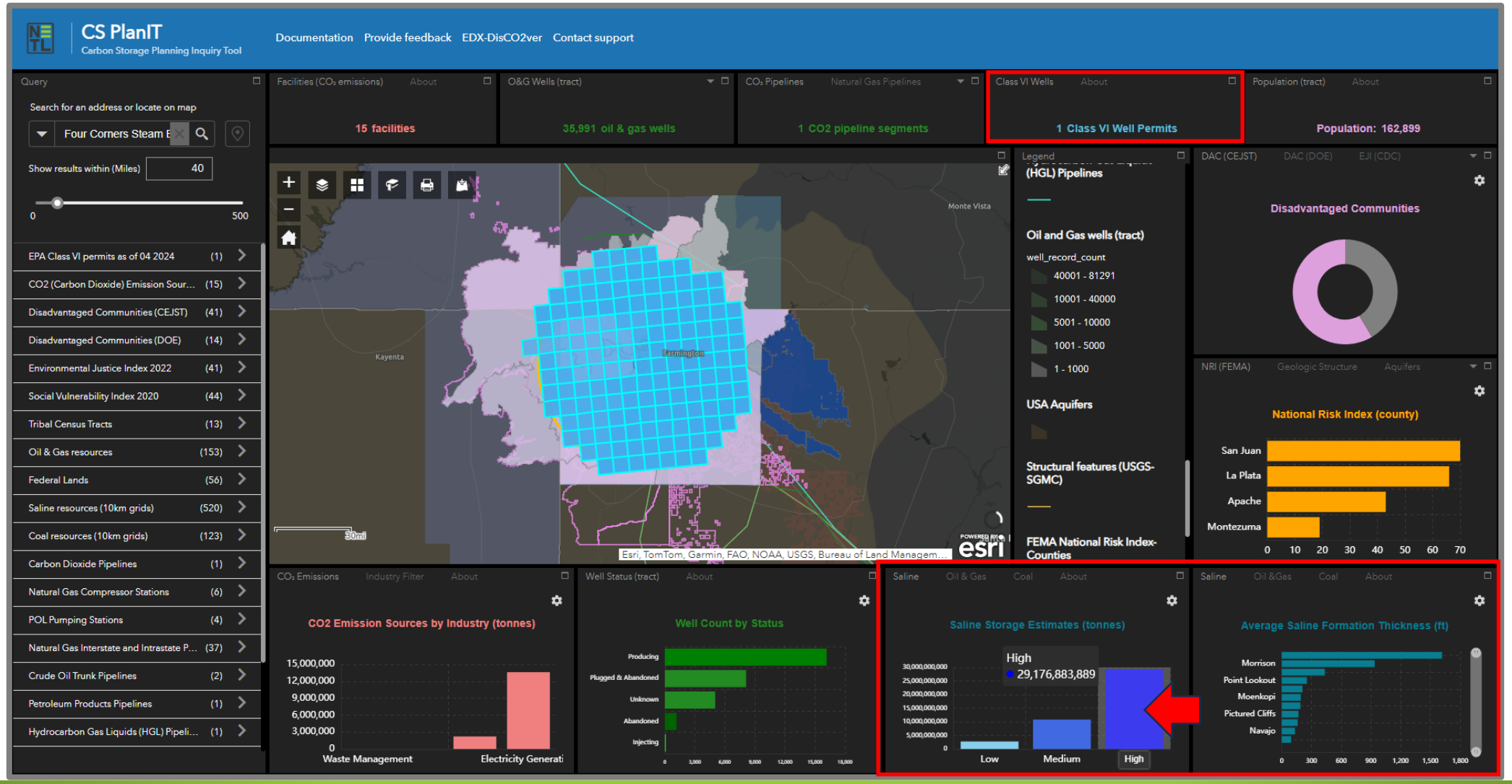

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Walkthrough - Charts and Statistics

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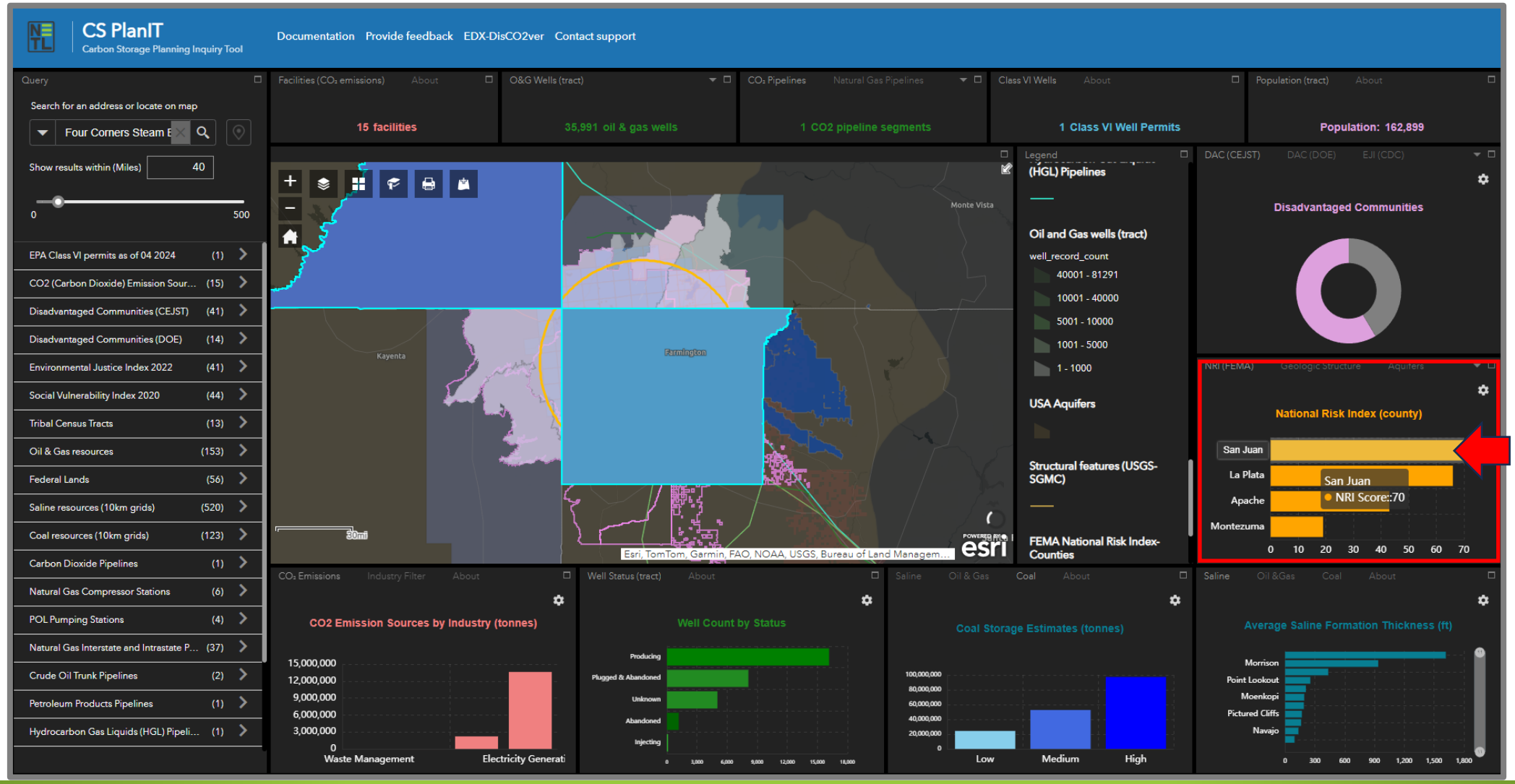
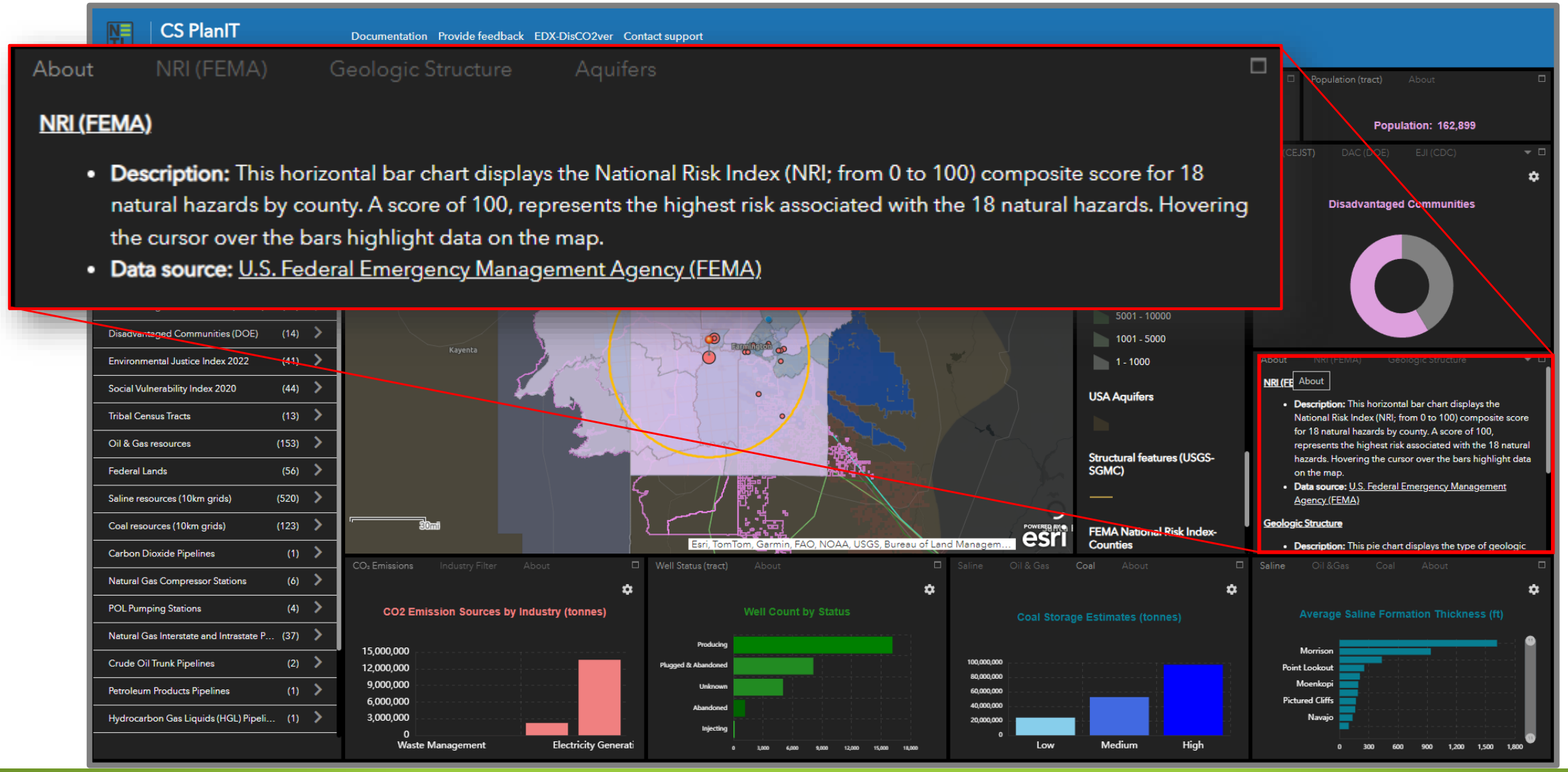


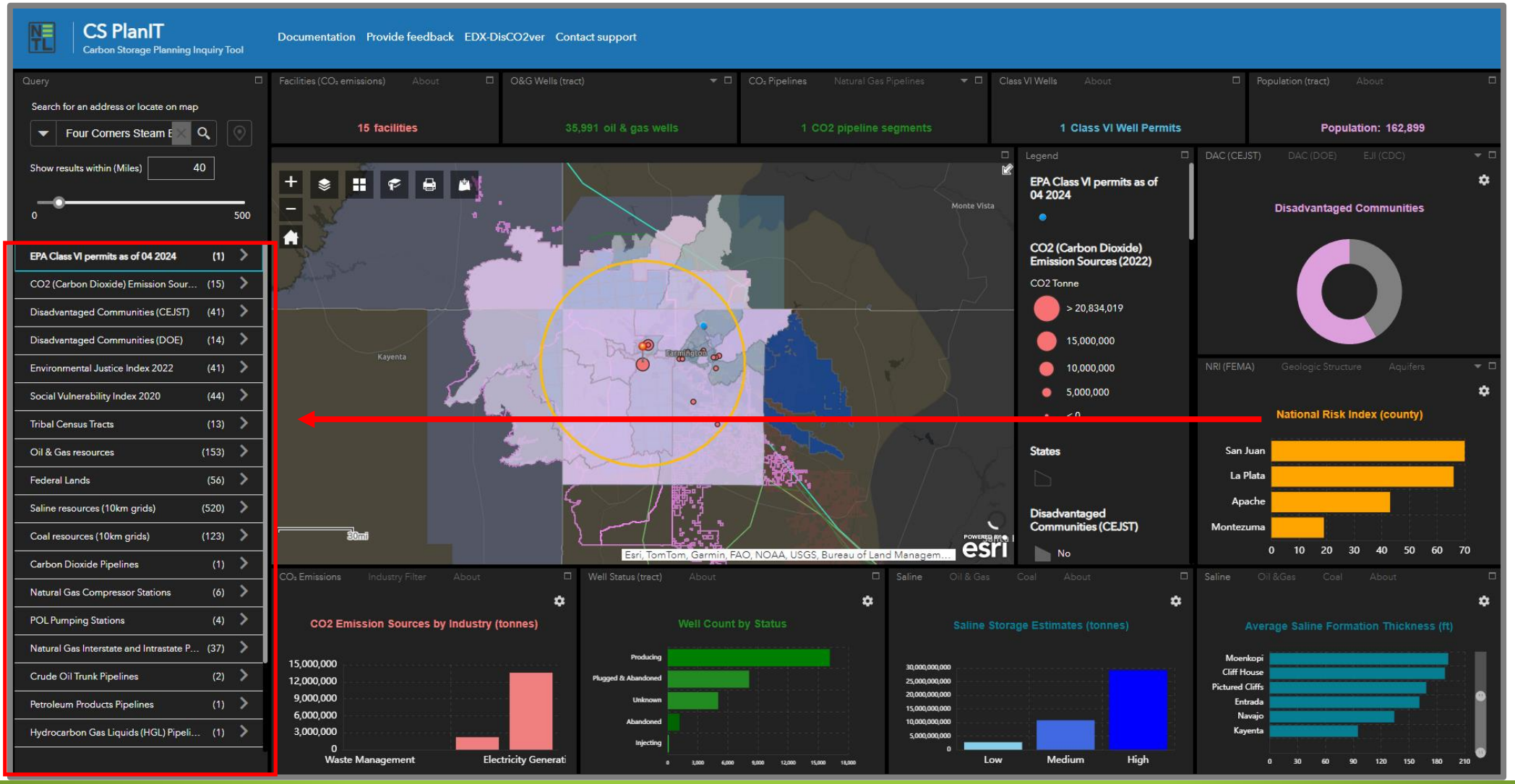
Carbon Storage Planning Inquiry Tool (CS PlanIT) v1.0

Walkthrough - Charts and Statistics "About" Tabs



Carbon Storage Planning Inquiry Tool (CS PlanIT) v1.0

Walkthrough - Data Filtering/Interrogation



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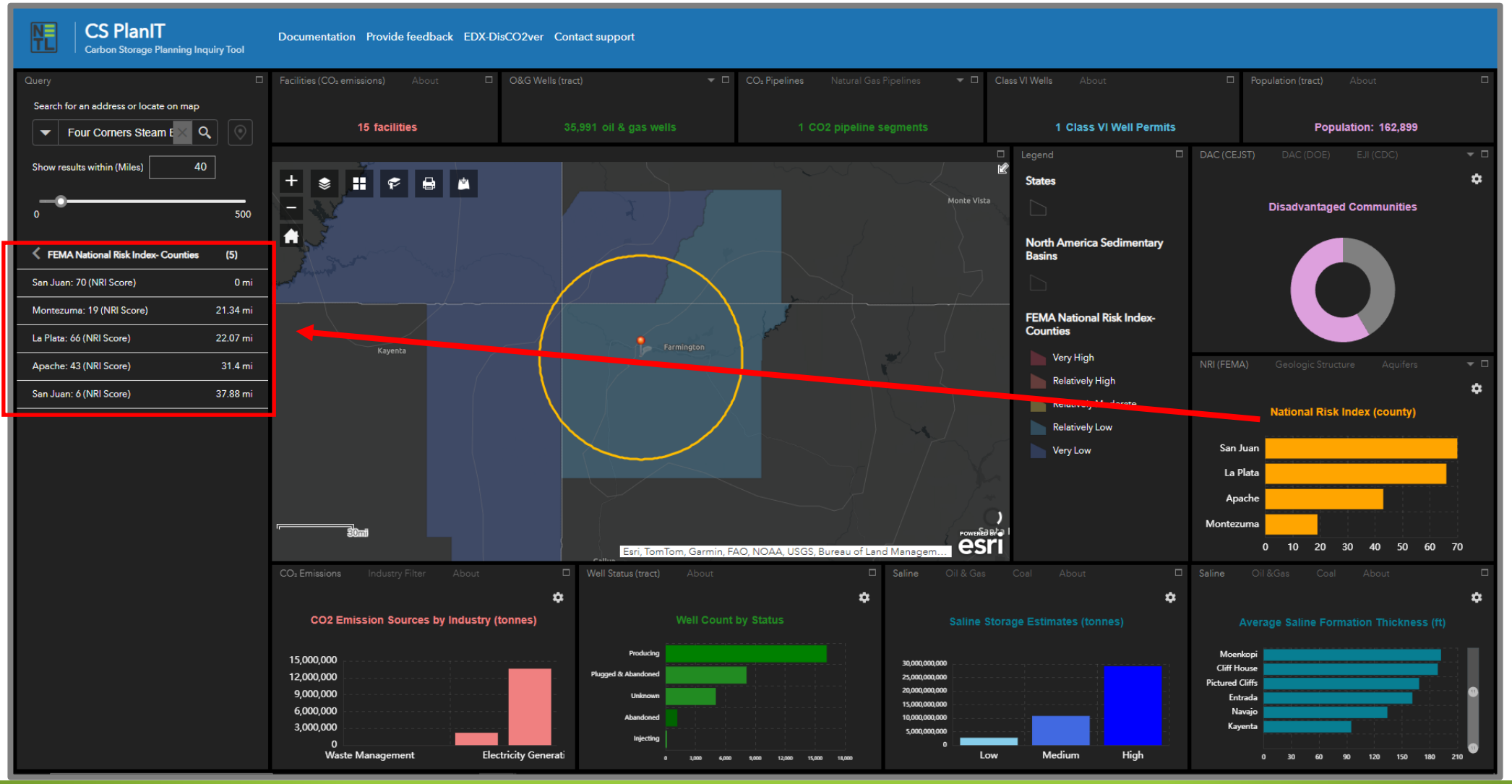
Walkthrough - Data Filtering/Interrogation



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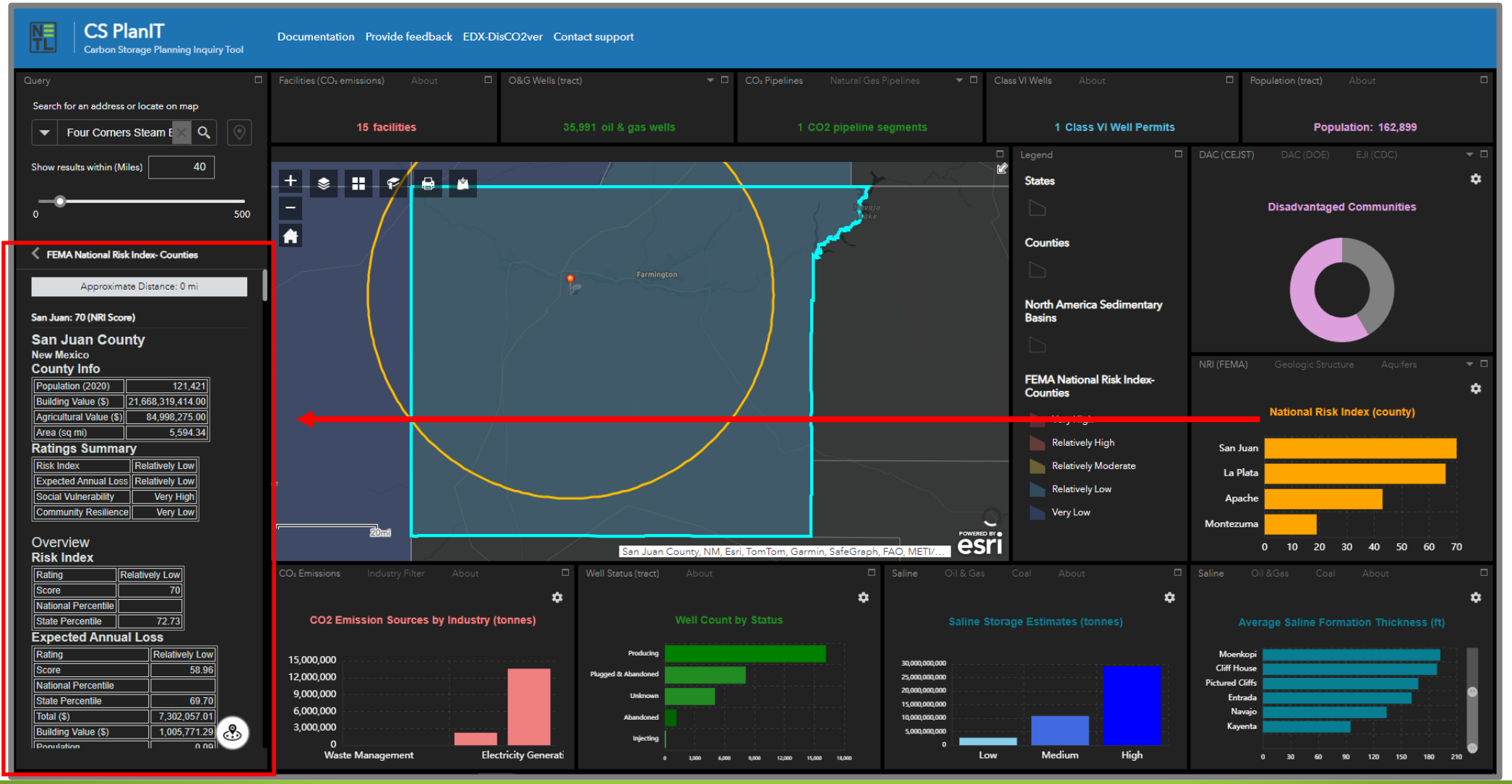
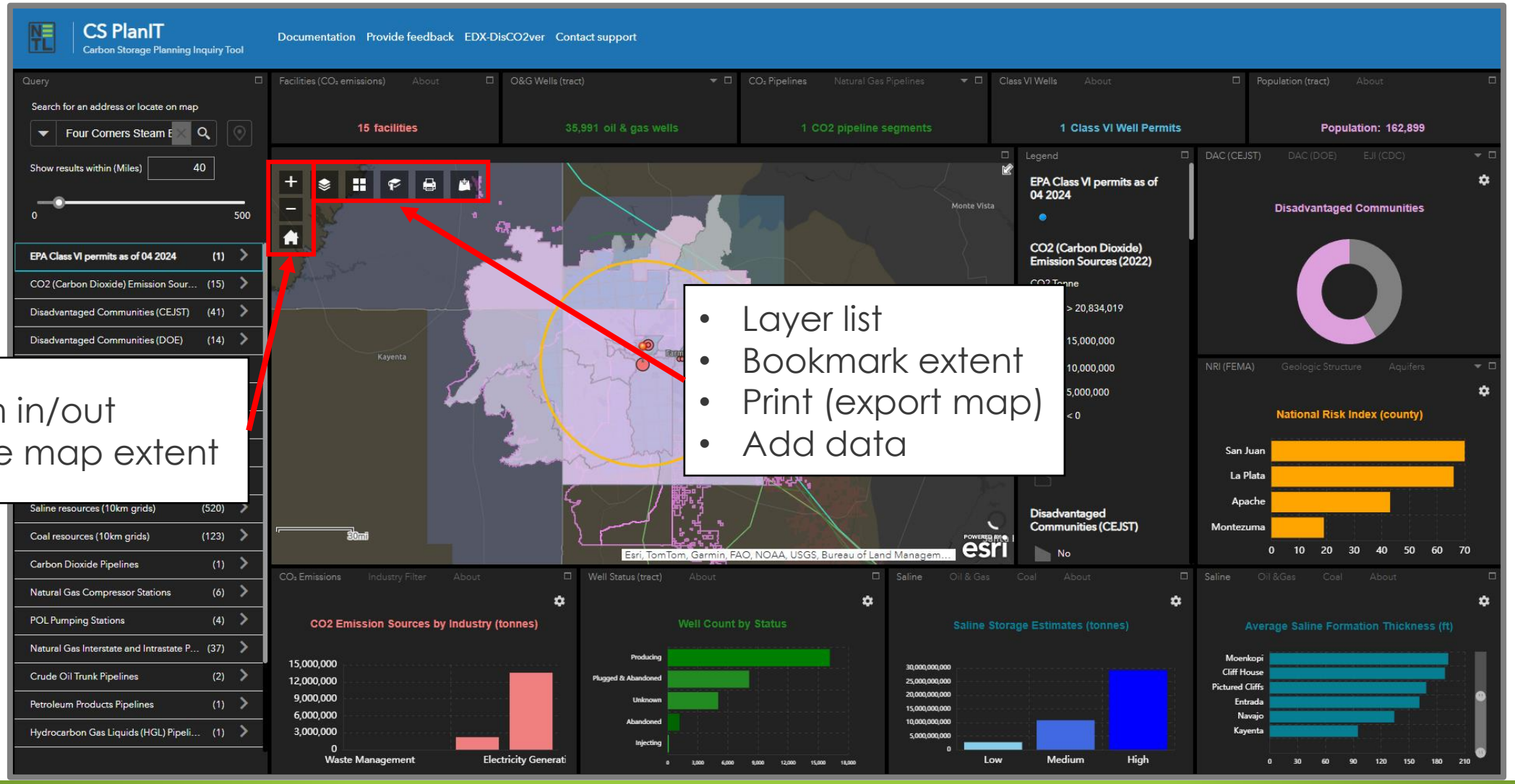
Walkthrough - Data Filtering/Interrogation



Carbon Storage Planning Inquiry Tool (CS PlanIT) v1.0

Walkthrough - Map Controls/Widgets

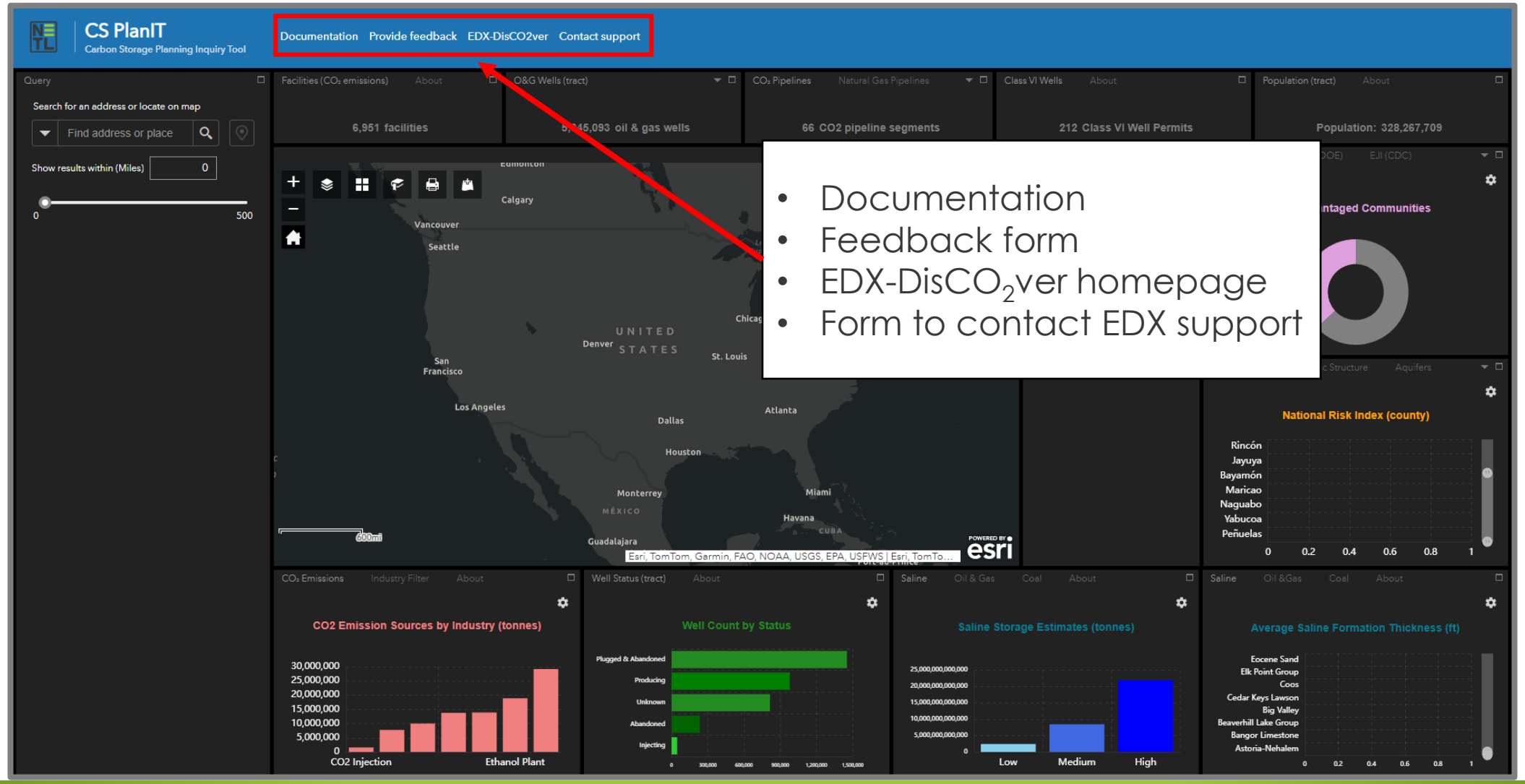


- Zoom in/out
- Home map extent

- Layer list
- Bookmark extent
- Print (export map)
- Add data

Carbon Storage Planning Inquiry Tool (CS PlanIT) v1.0

Walkthrough - External Links

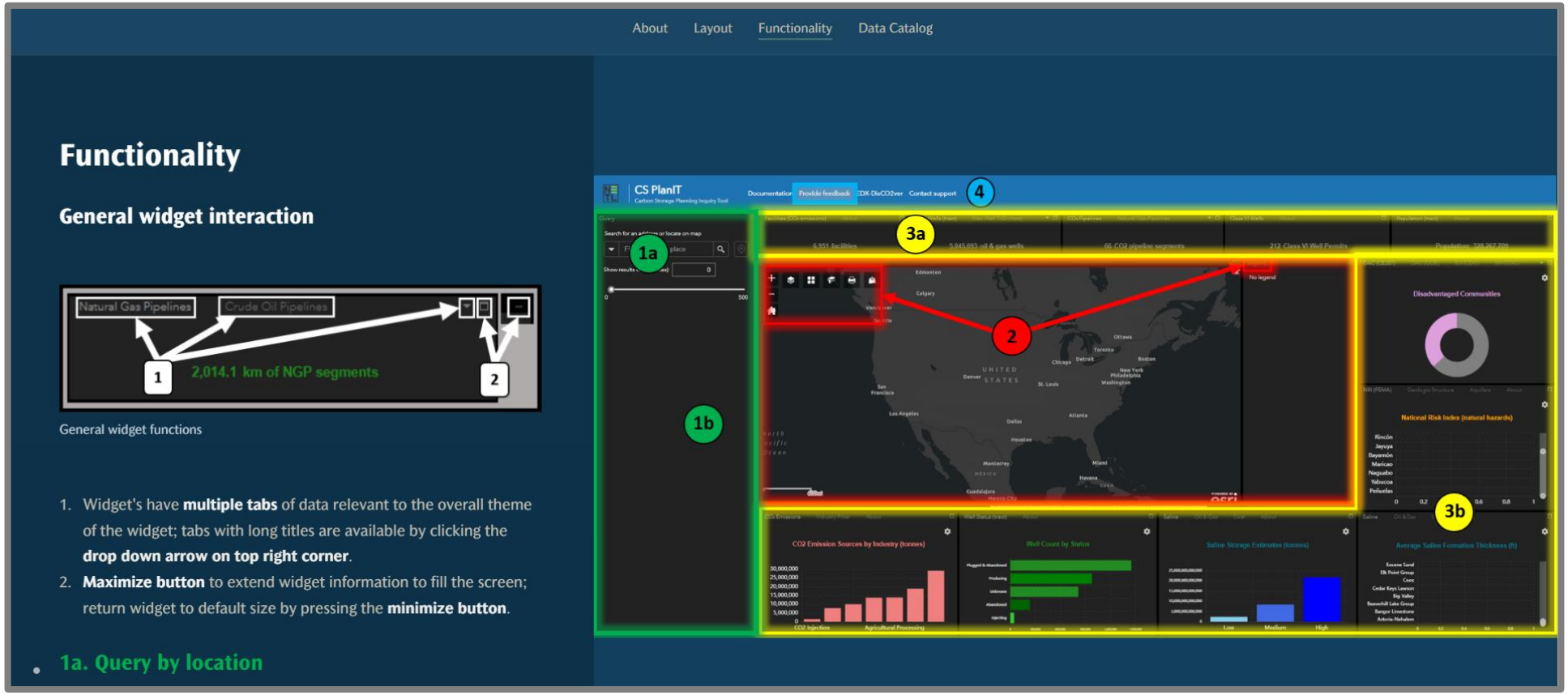


- Documentation
- Feedback form
- EDX-DisCO_2ver homepage
- Form to contact EDX support

Carbon Storage Planning Inquiry Tool (CS PlanIT) v1.0

Walkthrough - External Links

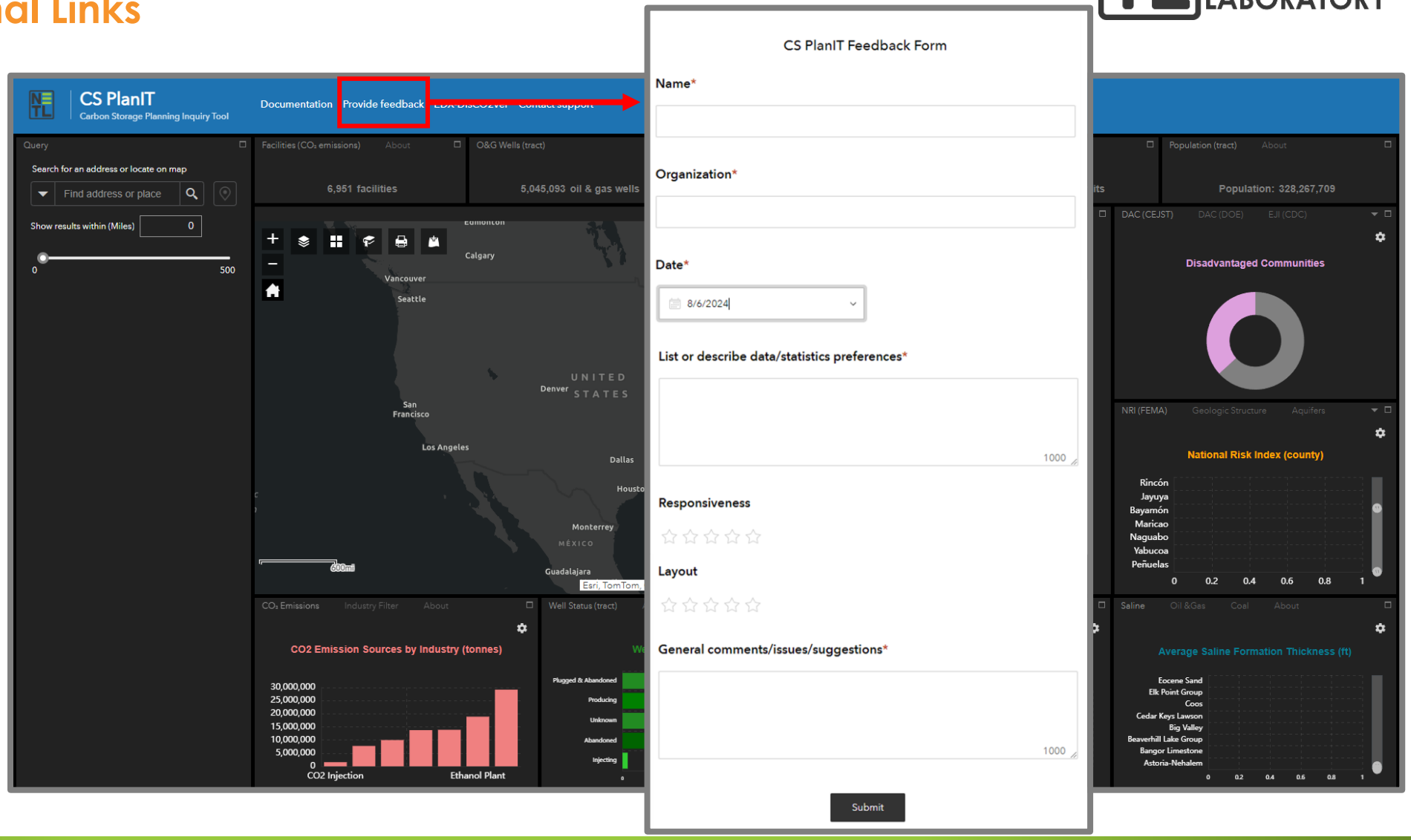
- CS PlanIT documentation web page
- ArcGIS Story map with 4 sections:
  - **About**
  - **Layout**
  - **Functionality**
  - **Data Catalog**



Carbon Storage Planning Inquiry Tool (CS PlanIT) v1.0

Walkthrough - External Links

- CS PlanIT Feedback Form
- Users can rate and comment on aspects of the tool



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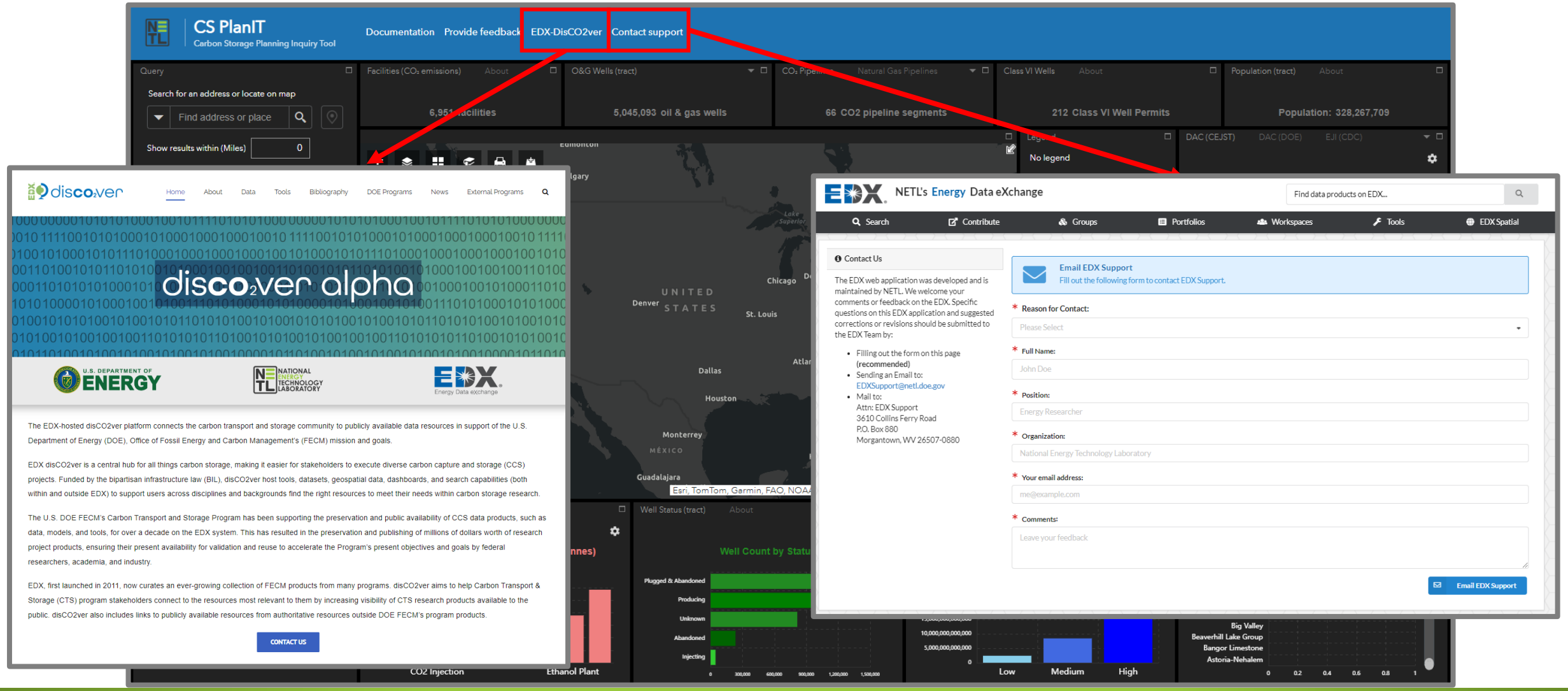
Walkthrough - External Links



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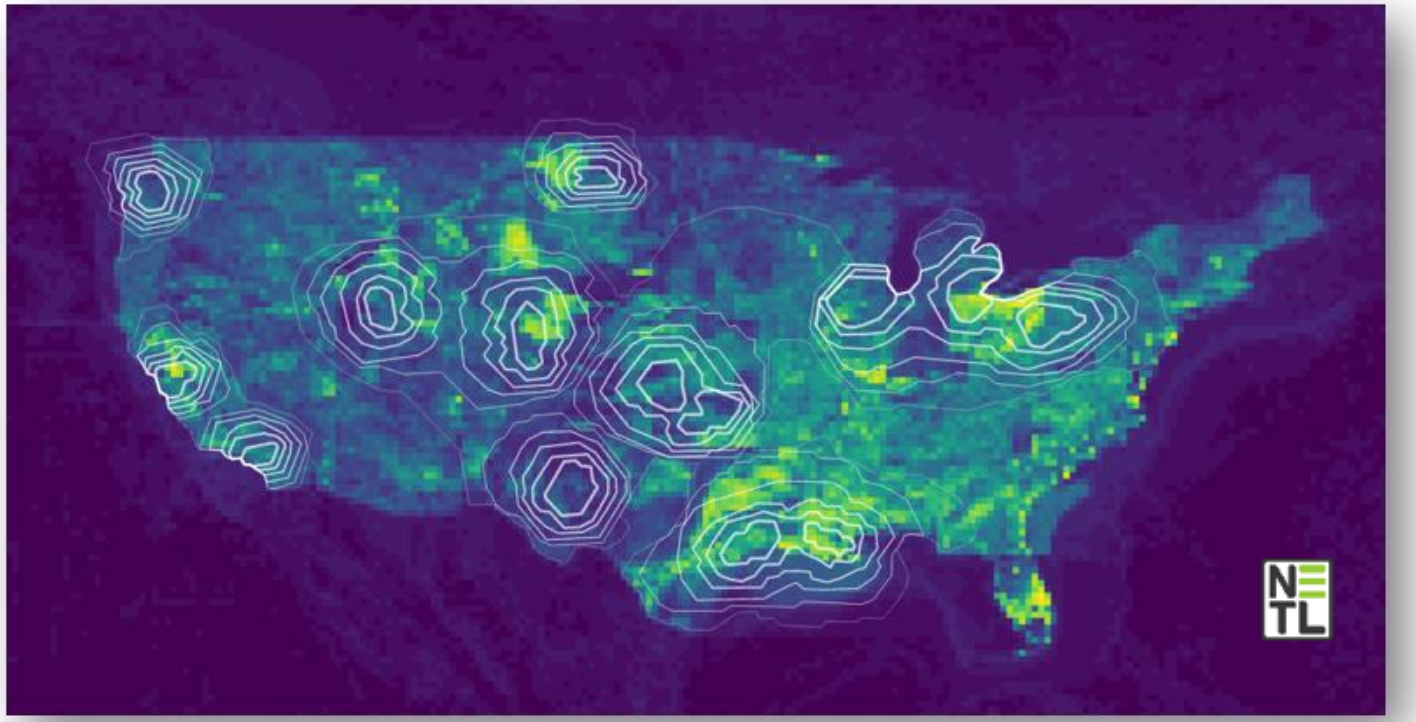
Next Steps and Challenges



Carbon Storage Technical Viability Assessment (CS TVA) data density analysis (brighter green, higher data density) overlain by white contour lines highlighting Great Plains Institute Carbon Storage Hub locations (Abramson, 2022). Analysis performed using the CSIL (Cumulative Spatial Impact Layers) tool (Romeo et al., 2019).

- Next steps/Challenges:
  - Evaluating and integrating key data from CS TVA (Carbon Storage Technical Viability Assessment) database (EDX4CCS portfolio)
  - Build out and adjusting tool layout and functionality
  - **Release of CS PlanIT v2.0 (April 2025)**

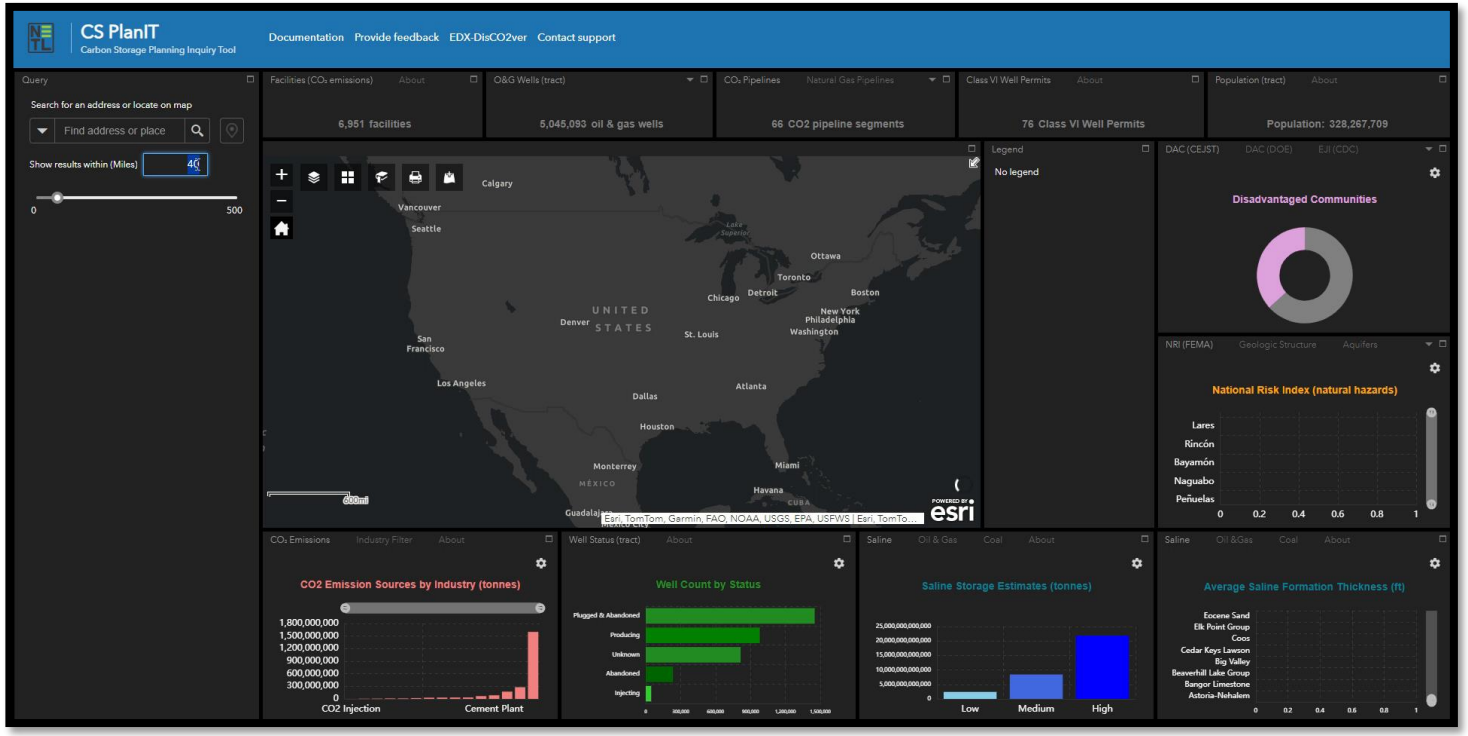
Carbon Storage Planning Inquiry Tool (CS PlanIT) v1.0

Ultimate Outcomes

- Version 1 available as of 6/30/2024
- Version 2 with data integrated from the CS TVA (Carbon Storage Technical Viability Assessment) database (release April 2025)

Stakeholder Benefit

- Quick and efficient access and insights into key CS datasets (including geologic, technical, environmental, social) to support CCS planning, feasibility, and resource assessment efforts
- Results can be leveraged to inform carbon storage resource and feasibility assessments



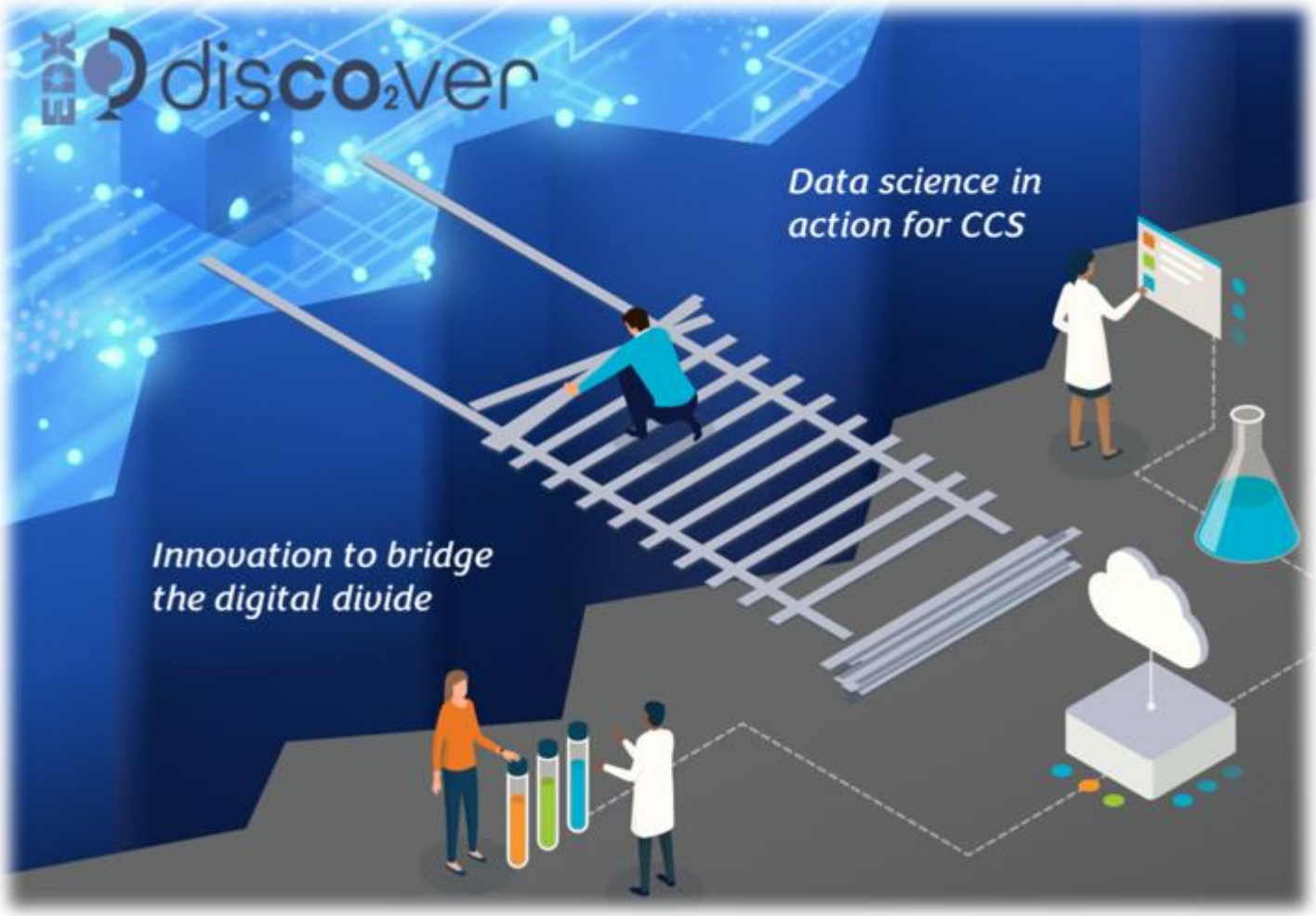
https://edx.netl.doe.gov/dataset/cs-planit-carbon-storage-planning-inquiry-tool

Live Tool Demos on Tuesday Evening

What: **EDX4CCS and other carbon storage data and tool demos**

When: **5:45 - 7:45 p.m.**

Where: **The Ballroom Foyer and East/West Atriums**



In demo "theater room" EDX Energy Data eXchange **support team** will offer **in person demos & Q&A**

References

Abramson et al. (2022) An Atlas of Carbon and Hydrogen Hubs for United States Decarbonization. Great Plains Institute, https://scripts.betterenergy.org/CarbonCaptureReady/GPI_Carbon_and_Hydrogen_Hubs_Atlas.pdf

Romeo, L., Nelson, J., Wingo, P., Bauer, J., Justman, D., & Rose, K. (2019). Cumulative spatial impact layers: A novel multivariate spatio-temporal analytical summarization tool. Transactions in GIS, 23(5), 908-936.

Justman, D., Pantaleone, S., Sharma, M., Romeo, L., Morkner, P. (2024) CS PlanIT (Carbon Storage Planning Inquiry Tool) , 6/28/2024, https://edx.netl.doe.gov/dataset/cs-planit-carbon-storage-planning-inquiry-tool, DOI: 10.18141/2377953

Acknowledgments

This work was performed in support of the U.S. Department of Energy's (DOE) Office of Fossil Energy and Carbon Management's Geo-Analysis and Monitoring Team and was developed jointly through the U.S. DOE Office of Fossil Energy and Carbon Management's EDX4CCS Project, in part, from the Bipartisan Infrastructure Law.

This research was supported in part by an appointment to the U.S. Department of Energy (DOE) Postgraduate Research Program at the National Energy Technology Laboratory (NETL) administered by the Oak Ridge Institute for Science and Education (ORISE).

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