



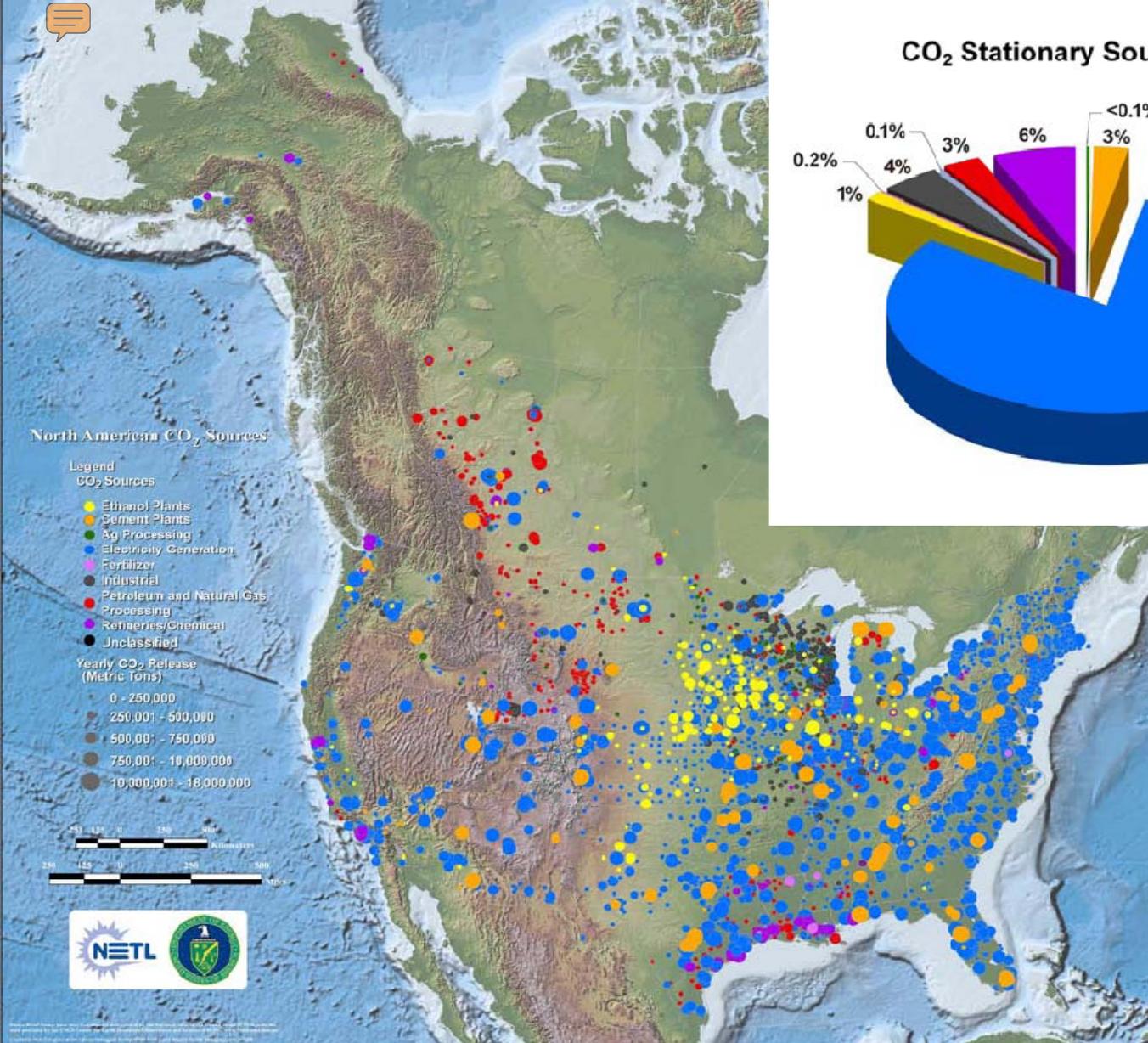
# **U.S. Geological Survey National Geologic Carbon Dioxide Sequestration Assessment**

**U.S. Geological Survey  
Department of the Interior**

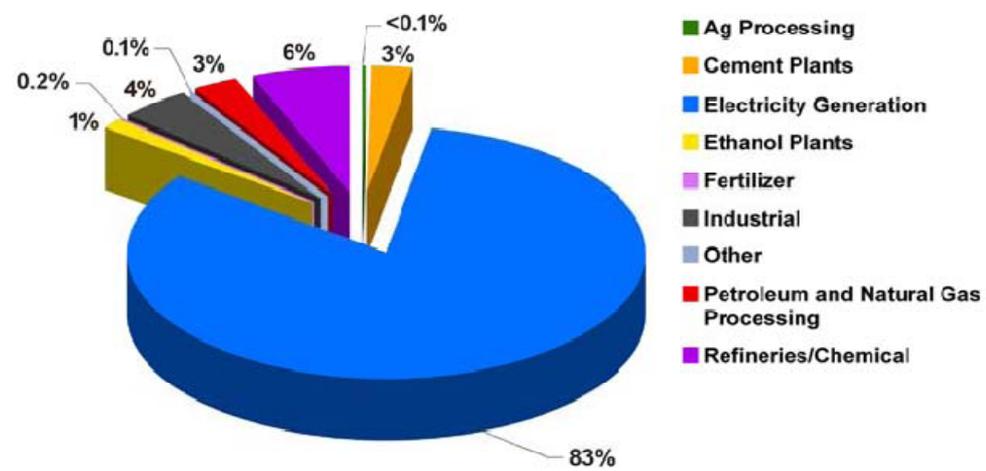


# Outline for Presentatoin

- Introduction
- Overview of Legislation
- Geologic Model
- Methodology
- Current Assessment Activities

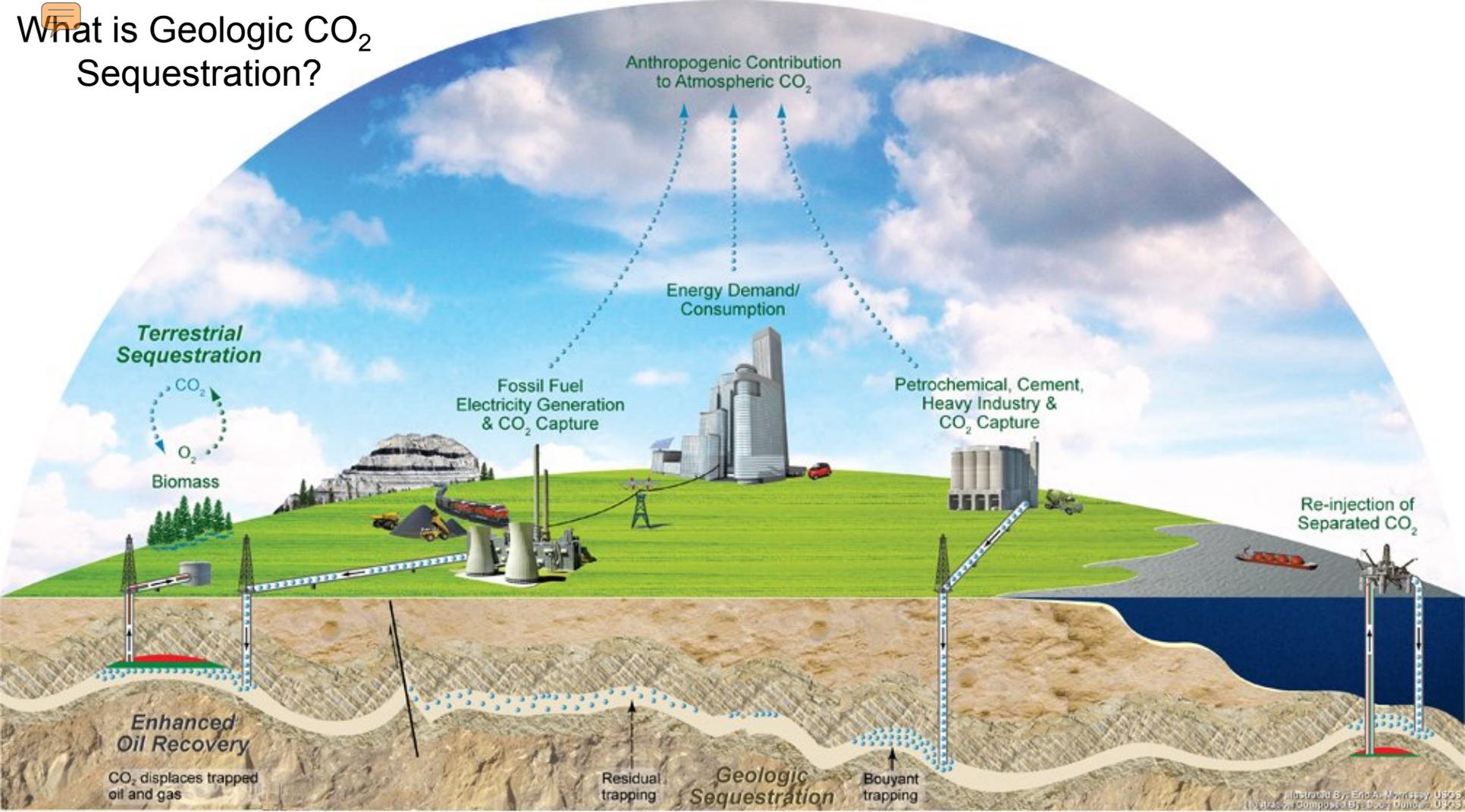


**CO<sub>2</sub> Stationary Source Emissions by Category**



Source: DOE NETL, 2008, Carbon Sequestration Atlas II of the United States and Canada

# What is Geologic CO<sub>2</sub> Sequestration?



## EXPLANATION

- CO<sub>2</sub> flow direction
- Oil and gas flow direction
- CO<sub>2</sub> storage volume
- Oxygen
- Gas
- Oil
- Seal formation
- Storage formation



# Energy Independence and Security Act 2007

## TITLE VII—CARBON CAPTURE AND SEQUESTRATION

### Subtitle B—Carbon Capture and Sequestration Assessment and Framework

#### SEC. 711. CARBON DIOXIDE SEQUESTRATION CAPACITY ASSESSMENT.

(b) METHODOLOGY— ...shall develop a methodology for conducting an assessment under subsection (f), taking into consideration—

- (1) the geographical extent of all potential sequestration formations in all States;
- (2) the capacity of the potential sequestration formations;
- (3) the injectivity of the potential sequestration formations;
- (4) an estimate of potential volumes of oil and gas recoverable by injection and sequestration of industrial carbon dioxide in potential sequestration formations;
- (5) the risk associated with the potential sequestration formations; and
- (6) the work done to develop the Carbon Sequestration Atlas of the United States and Canada that was completed by DOE.

(c) COORDINATION—

- (1) Federal Coordination
- (2) State Coordination

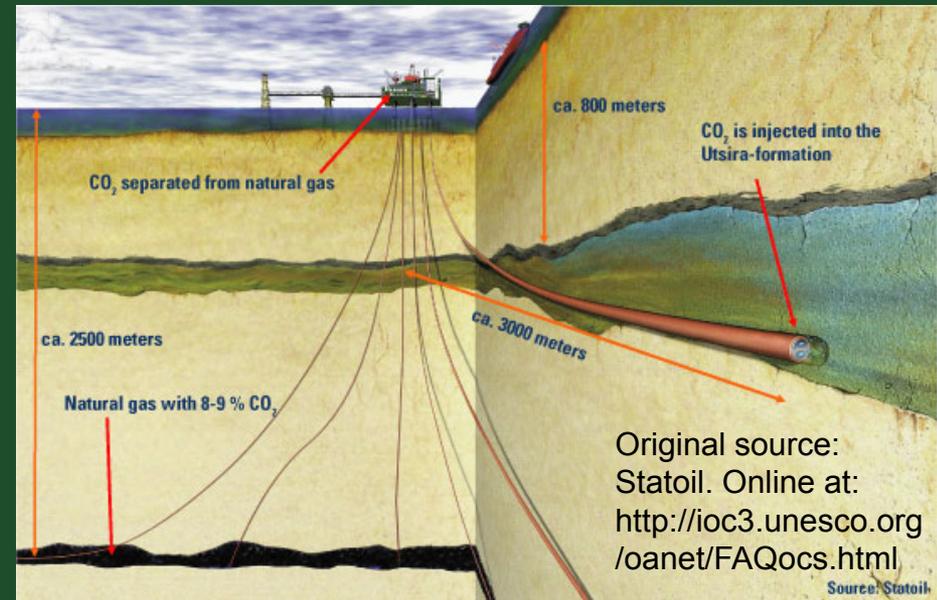
# Carbon Capture and Storage

- Capture:

- Flue gas is 5 -15 % CO<sub>2</sub>, must be separated for storage
- Compressed CO<sub>2</sub> for pipeline transport

- Geological storage:

- The USGS assessment will focus on CO<sub>2</sub> injected at depths of 3,000 to 13,000 ft
- CO<sub>2</sub> is buoyant and displaces existing water, oil, or gas
- Storage formation must be sealed to retain buoyant CO<sub>2</sub>
- USGS assessment methodology addresses buoyant and residual trapping



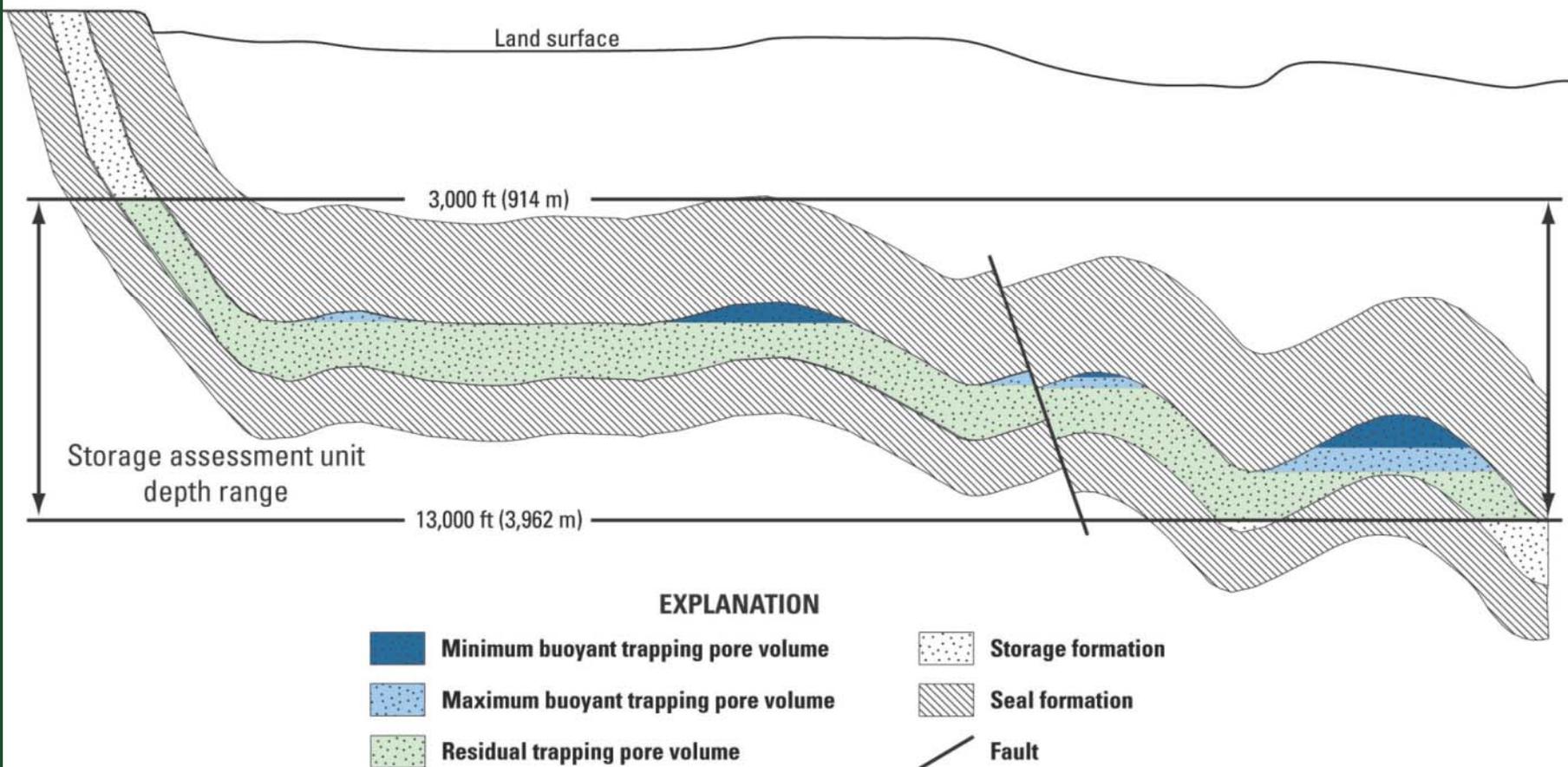


# USGS Methodology

- Geologically-based, statistically-sound hypotheses for quantities of resource
- Comprehensive & consistent treatment (compatible/comparable to assessments in other areas)
- Transparent – methodology, assumptions
- Probabilistic – range of values to reflect uncertainty
- Not project site specific, estimates are regional (but geological models are developed for each region)
- External expert input

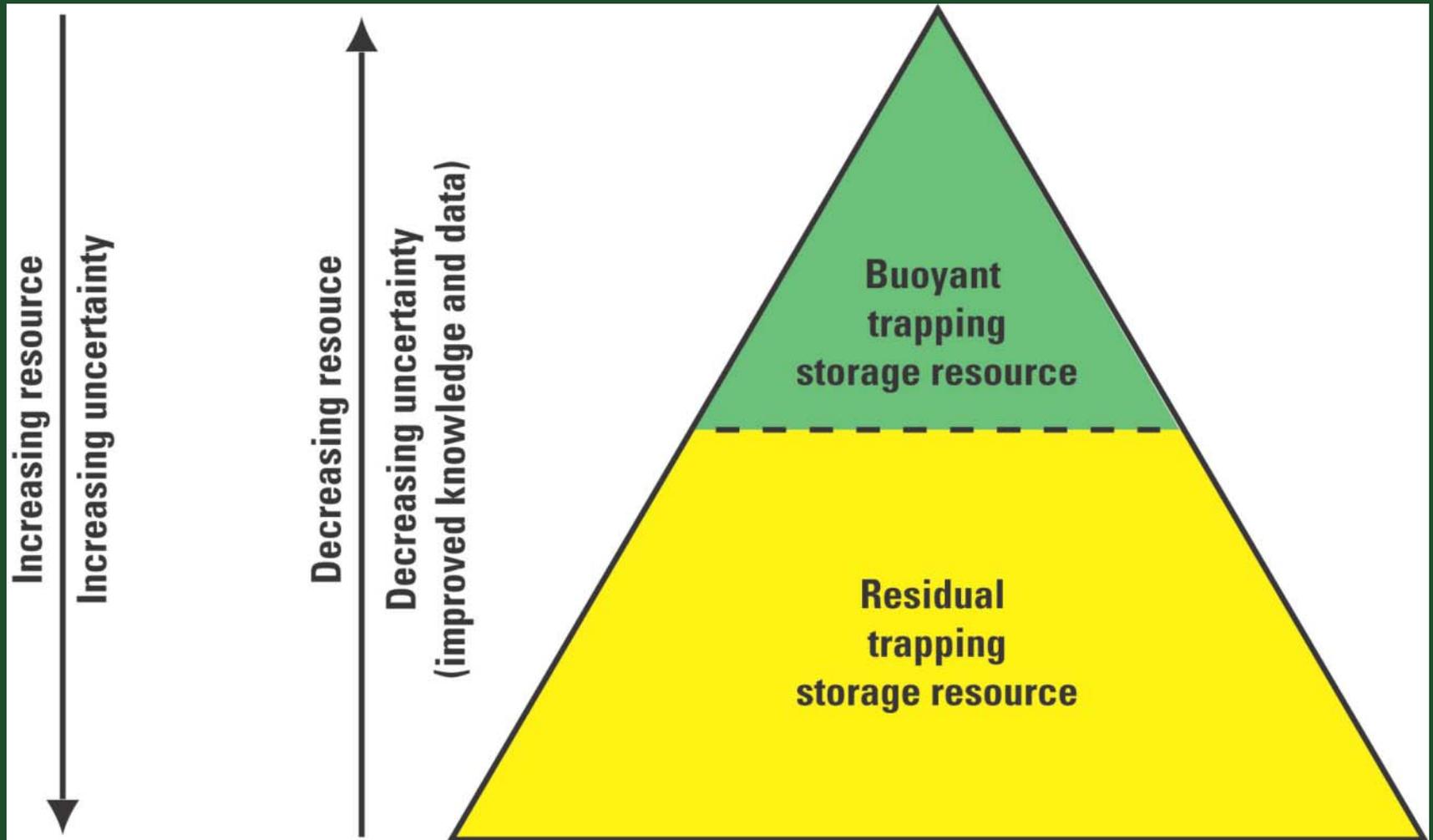
# Schematic Storage Formation Model

## Storage Assessment Unit, Cross Section

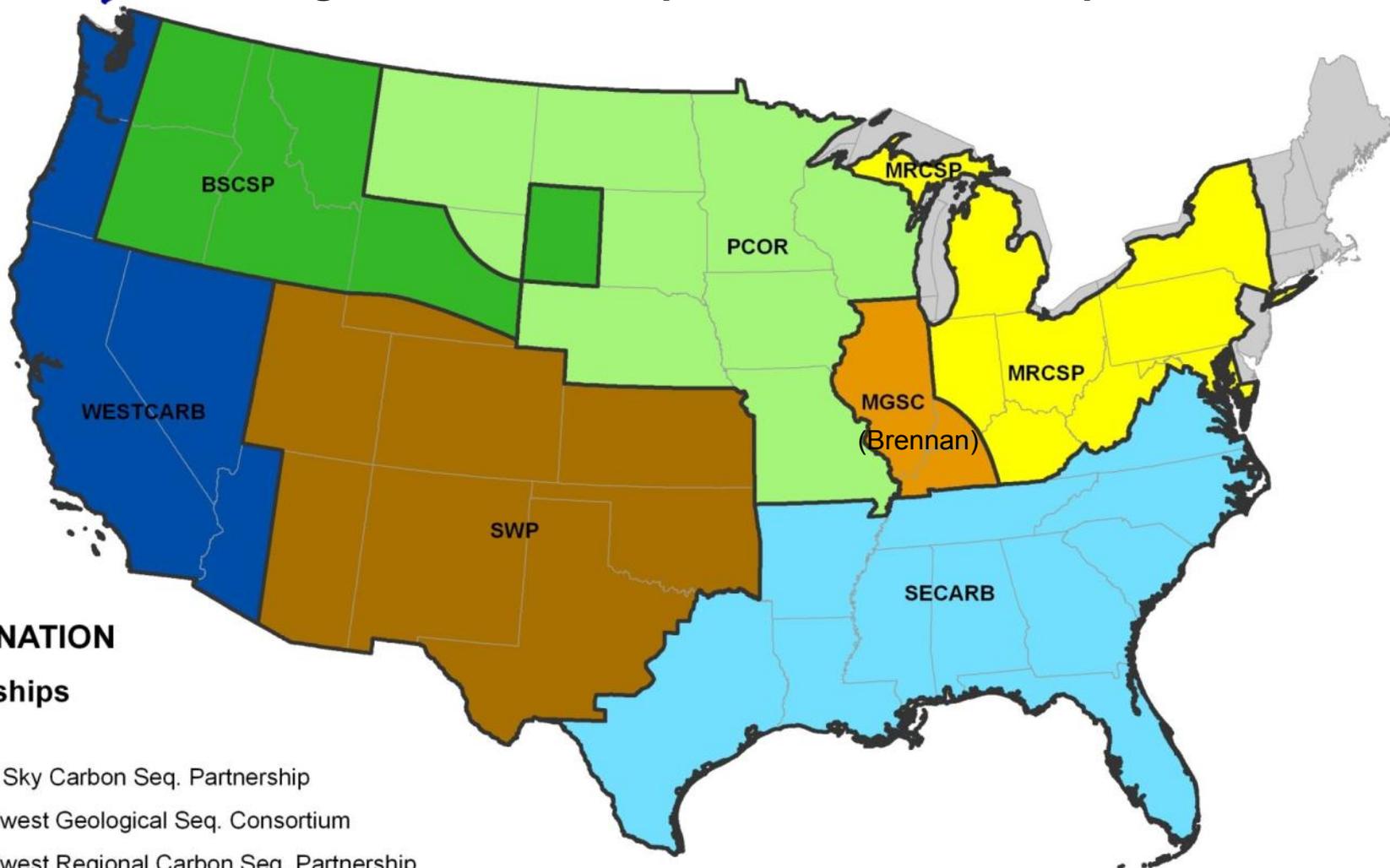


# Resource Triangle

Technically accessible CO<sub>2</sub> storage resources



# U.S. Department of Energy Regional Carbon Sequestration Partnerships



## EXPLANATION

### Partnerships

#### Name

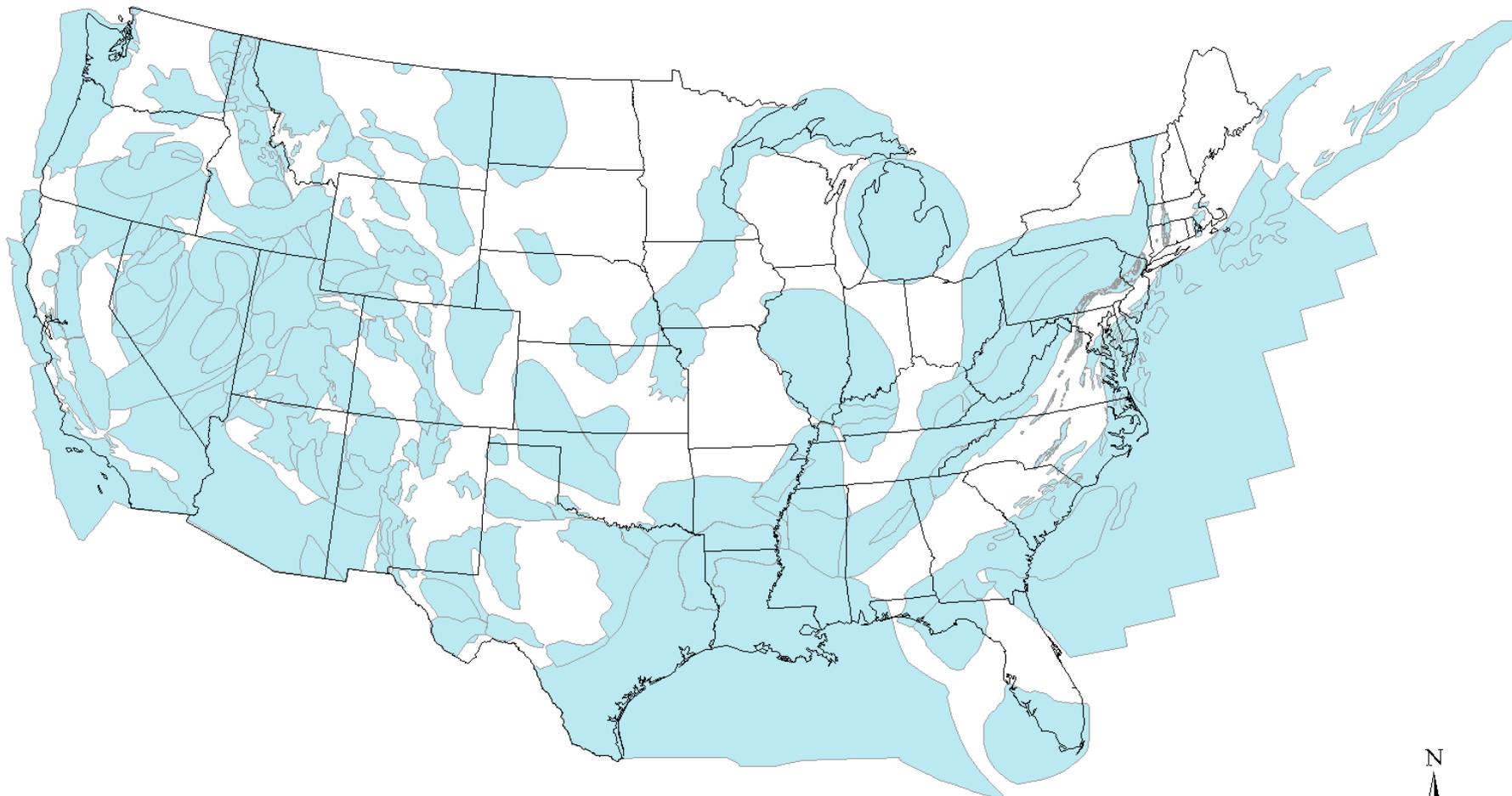
-  Big Sky Carbon Seq. Partnership
-  Midwest Geological Seq. Consortium
-  Midwest Regional Carbon Seq. Partnership
-  Southeast Regional Carbon Seq. Partnership
-  Southwest Regional Partnership on Carbon Seq.
-  The Plains CO2 Reduction Partnership
-  West Coast Regional Carbon Seq. Partnership

Modified from DOE NETL 2008 Carbon Sequestration Atlas II of the United States and Canada — Version 2  
[http://www.netl.doe.gov/technologies/carbon\\_seq/refshelf/atlasII/](http://www.netl.doe.gov/technologies/carbon_seq/refshelf/atlasII/)

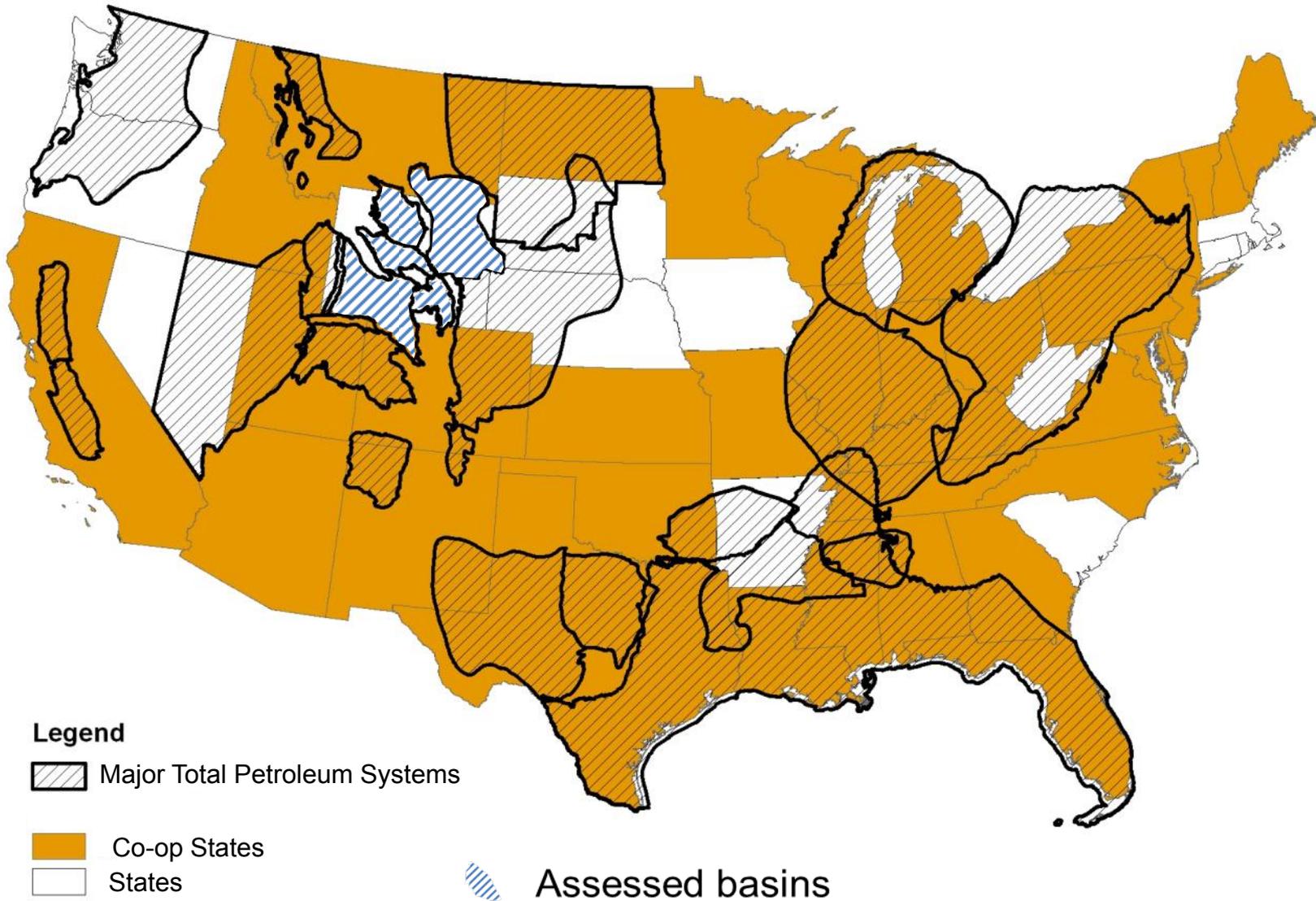




# USGS Sedimentary Basins of Lower 48 States



# Major Petroleum Systems and Assessed basins for CO<sub>2</sub> storage





# Final CO<sub>2</sub> Assessment Report

- USGS Circular (model 1995 NOGA assessment report summary - Circ. 1118)  
Planned for 2013
- On-line supporting data
  - Maps with SAU boundaries
  - Summary reports for each SAU
  - Data will be released as available



# Conclusions

- The USGS assessment methodology can estimate the technically accessible CO<sub>2</sub> storage resource at a variety of levels of uncertainty across a formation
- The methodology uses geologic data, processes, geologic models, and rock properties to populate probabilistic analysis models to produce a robust estimate of CO<sub>2</sub> storage resource within a Storage Assessment Unit (SAU)
- The assessment process is under way; USGS needs help from the Regional Partnerships and State geological surveys to complete the assessment in three years.



For more information contact:

Brenda Pierce

[bpierce@usgs.gov](mailto:bpierce@usgs.gov)

703-648-6421

Peter Warwick

[pwarwick@usgs.gov](mailto:pwarwick@usgs.gov)

703-648-6469

Sean Brennan

[sbrennan@usgs.gov](mailto:sbrennan@usgs.gov)

703-648-6434



<http://energy.usgs.gov>

[http://rmgsc.cr.usgs.gov/carbon\\_seq/](http://rmgsc.cr.usgs.gov/carbon_seq/)

[http://energy.er.usgs.gov/health\\_environment/co2\\_sequestration/](http://energy.er.usgs.gov/health_environment/co2_sequestration/)

<http://pubs.usgs.gov/of/2010/1127/>