NATIONAL ENERGY TECHNOLOGY LABORATORY


# Working Together - The South and RD&D Partnering


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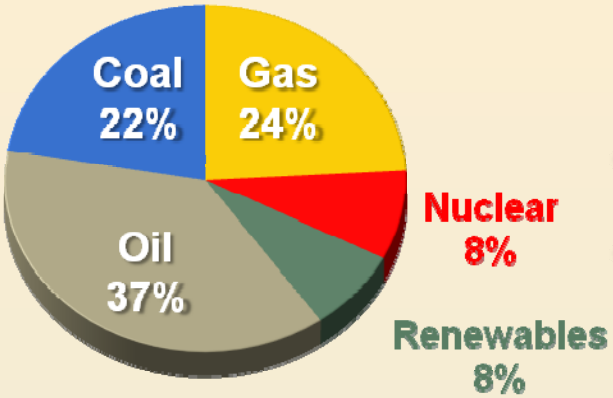
# National Energy Technology Laboratory

***Advancing energy options to fuel our economy, strengthen our security, and improve our environment***


- **Full-service DOE federal laboratory**
  - Program Planning
  - Budget Formulation and Execution
  - Procurement
  - Project Management
  - Program Performance and Benefit Analyses
  - On-site Research
- **Dedicated to energy RD&D, domestic energy resources**
  - Fossil Energy
  - Support for EE and OE
- **Emphasis on industry, academia, and government collaborations**

# Energy Demand 2008

100 QBtu / Year
84% Fossil Energy



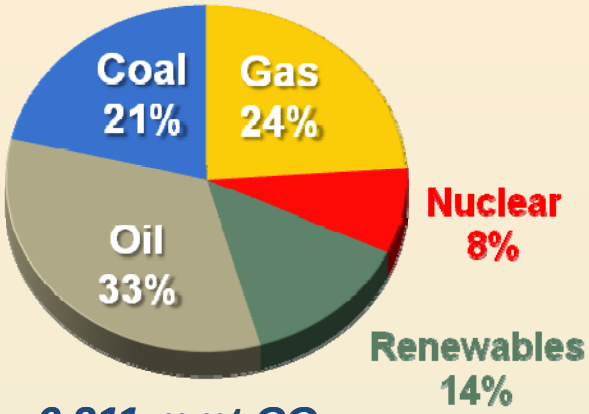

5,838 mmt $CO_2$

+ 14%

United States

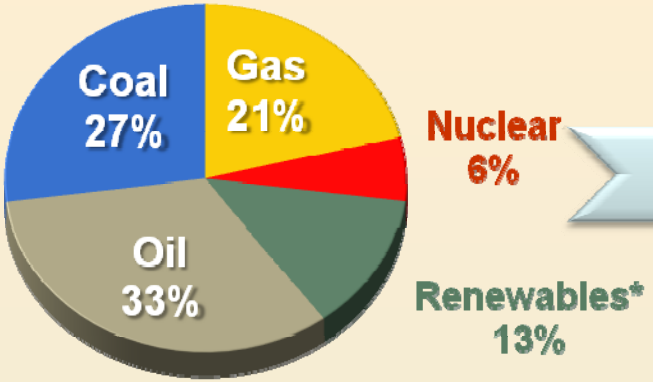
# Energy Demand 2035

114 QBtu / Year
78% Fossil Energy




6,311 mmt $CO_2$

487 QBtu / Year
81% Fossil Energy

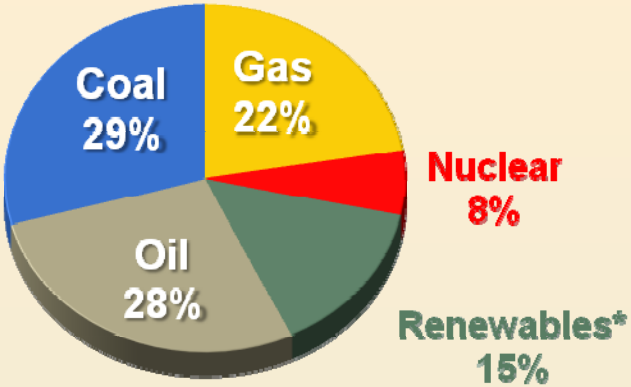



29,259 mmt $CO_2$

+ 47%

World

716 QBtu / Year
79% Fossil Energy




42,589 mmt $CO_2$

*Sources: U.S. data from EIA, Annual Energy Outlook 2011; World data from IEA, World Energy Outlook 2010, Current Policies Scenario*

** Primarily traditional biomass, wood, and waste.*

# DOE RD&D Portfolio

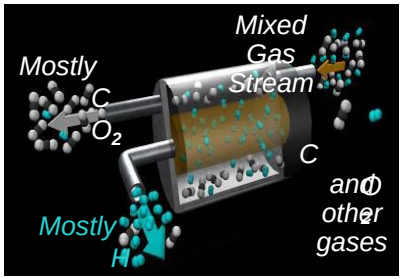
## *Integrated Technologies Are Necessary*

**Fuel Cells**

**Future Coal Energy Plant**

**Geologic Storage**

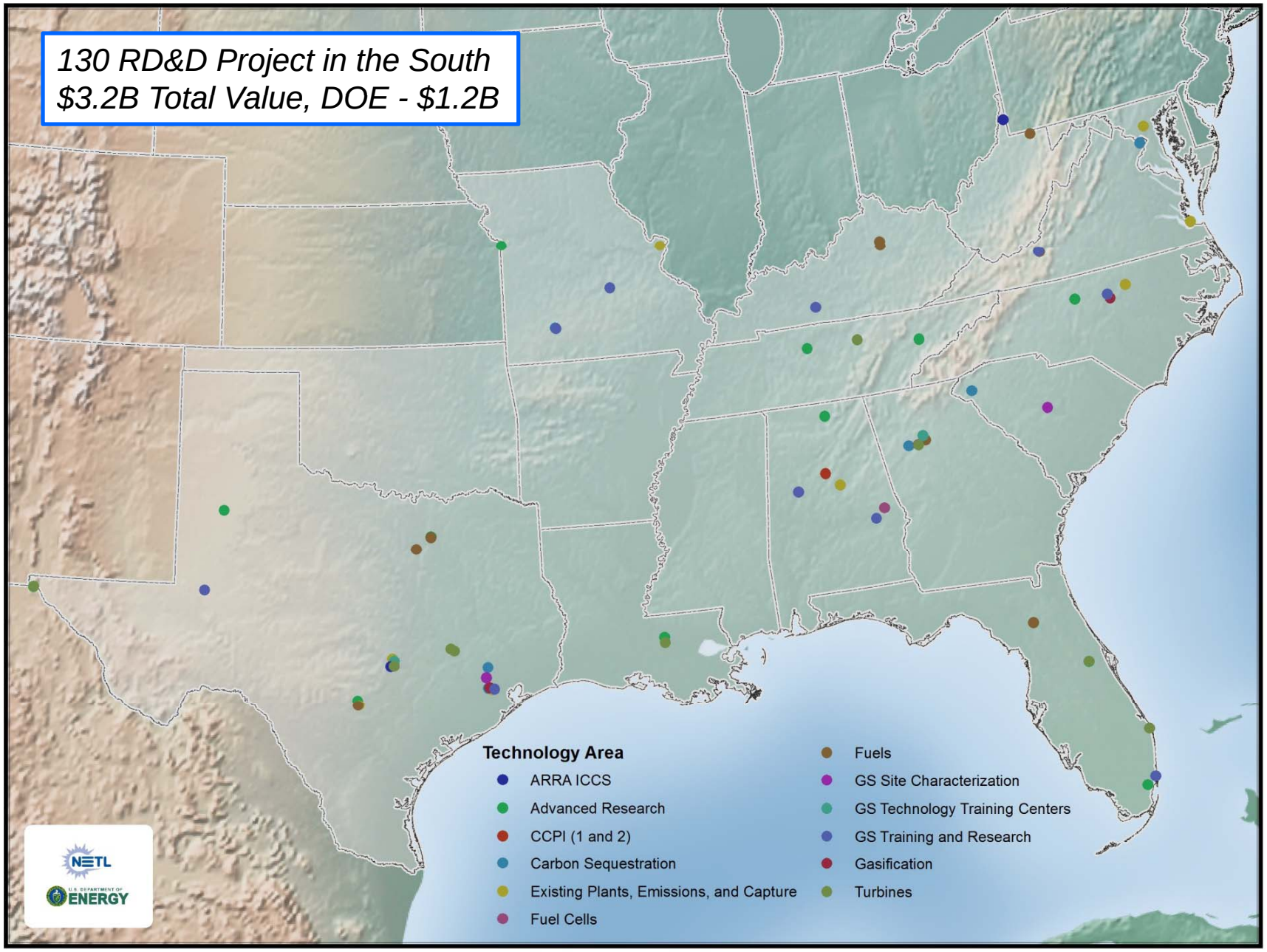
**Gasification**




**CO2 Capture**

**H2 Turbines**

**System Optimization**


130 RD&D Project in the South
$3.2B Total Value, DOE - $1.2B
Technology Area
ARRA ICCS
Advanced Research
CCPI (1 and 2)
Carbon Sequestration
Existing Plants, Emissions, and Capture
Fuel Cells
Fuels
GS Site Characterization
GS Technology Training Centers
GS Training and Research
Gasification
Turbines
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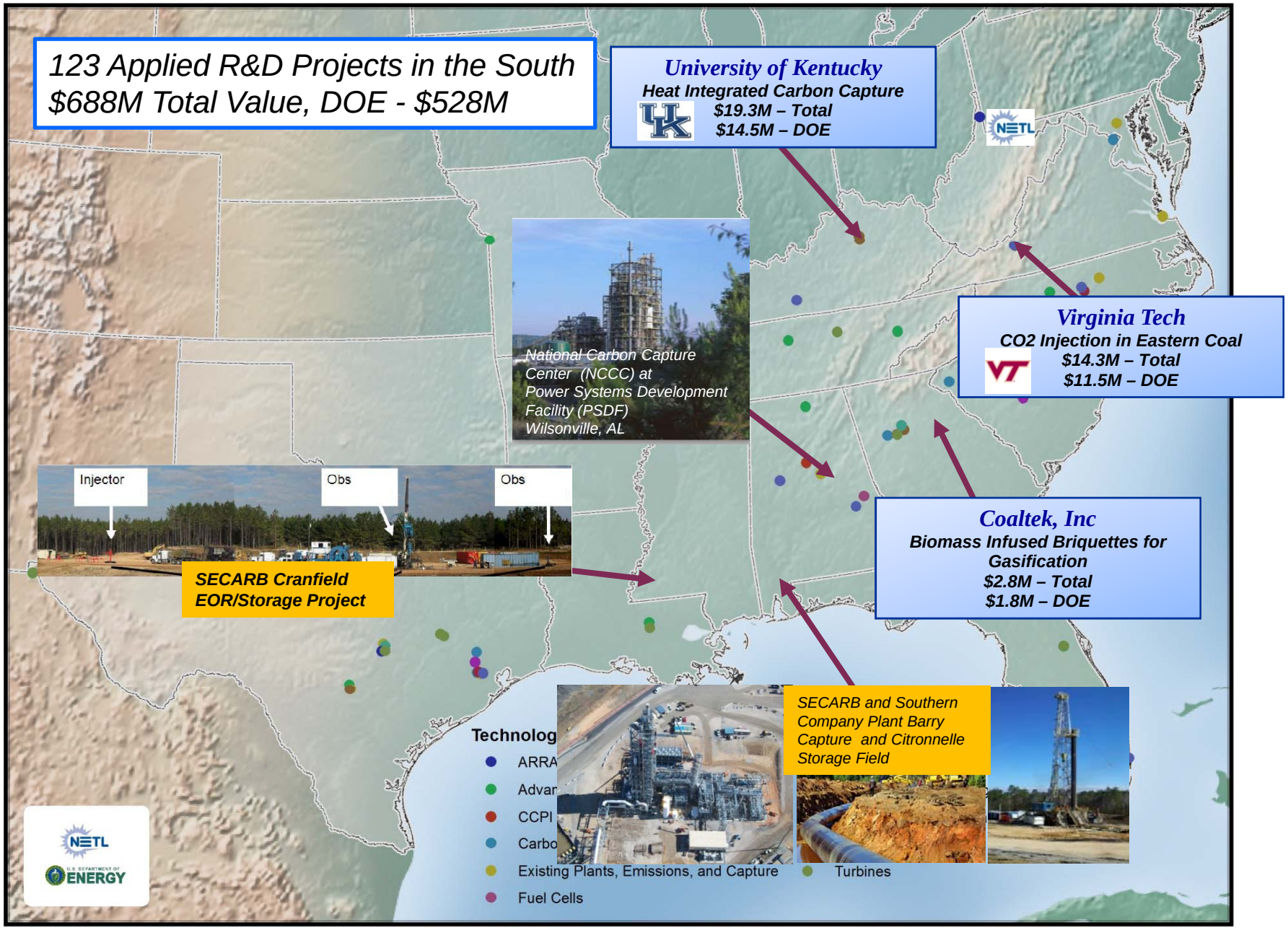
123 Applied R&D Projects in the South
$688M Total Value, DOE - $528M
University of Kentucky
Heat Integrated Carbon Capture
$19.3M – Total
$14.5M – DOE
Virginia Tech
CO2 Injection in Eastern Coal
$14.3M – Total
$11.5M – DOE
Coaltek, Inc
Biomass Infused Briquettes for Gasification
$2.8M – Total
$1.8M – DOE
National Carbon Capture Center (NCCC) at Power Systems Development Facility (PSDF) Wilsonville, AL
Injector
Obs
Obs
SECARB Cranfield EOR/Storage Project
SECARB and Southern Company Plant Barry Capture and Citronnelle Storage Field
Technolog
ARRA
Advar
CCPI
Carbo
Existing Plants, Emissions, and Capture
Fuel Cells
Turbines
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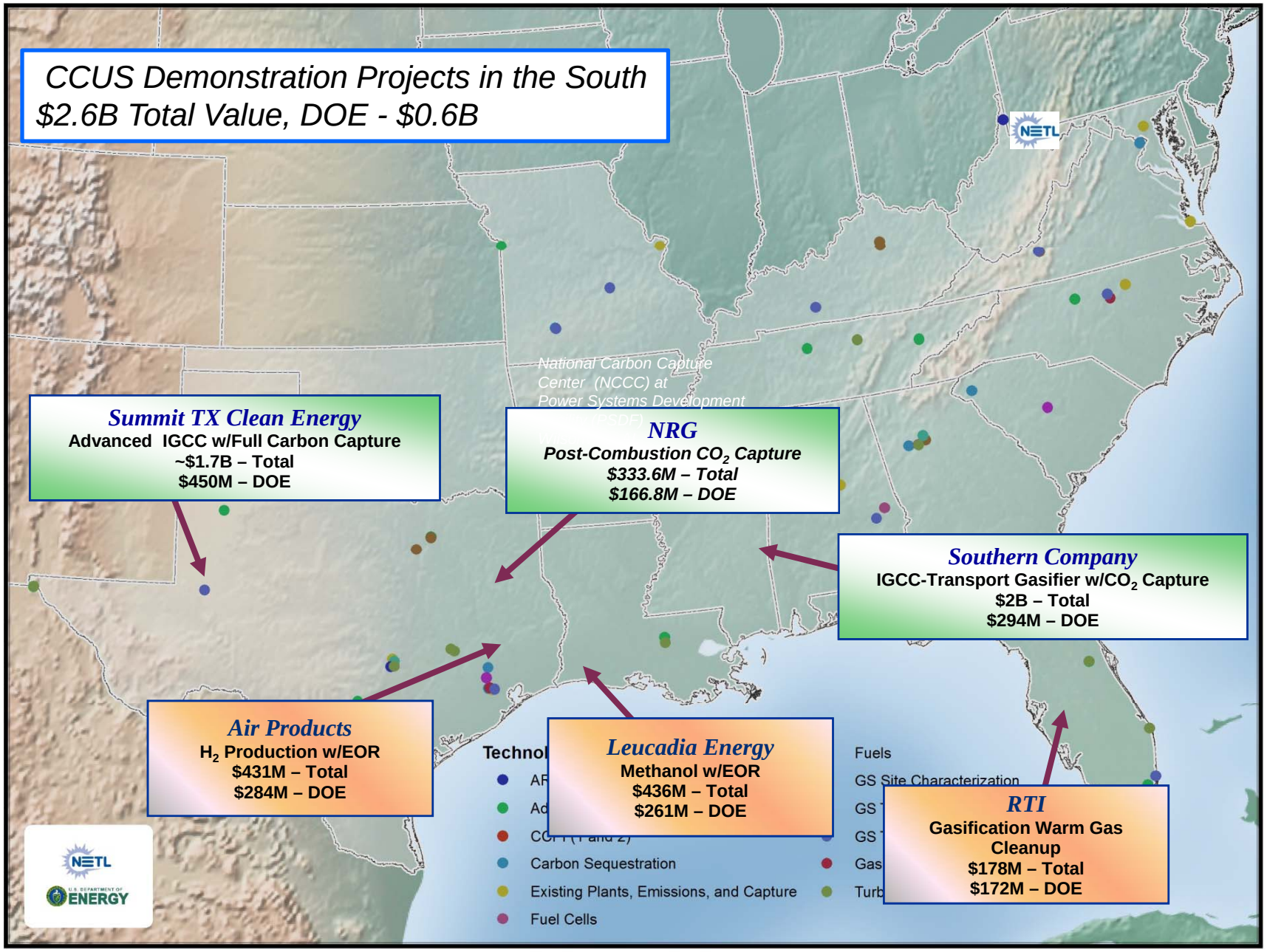
CCUS Demonstration Projects in the South
$2.6B Total Value, DOE - $0.6B
Summit TX Clean Energy
Advanced IGCC w/Full Carbon Capture
~$1.7B – Total
$450M – DOE
NRG
Post-Combustion $CO_2$ Capture
$333.6M – Total
$166.8M – DOE
Southern Company
IGCC-Transport Gasifier w/$CO_2$ Capture
$2B – Total
$294M – DOE
Air Products
$H_2$ Production w/EOR
$431M – Total
$284M – DOE
Leucadia Energy
Methanol w/EOR
$436M – Total
$261M – DOE
RTI
Gasification Warm Gas Cleanup
$178M – Total
$172M – DOE
National Carbon Capture Center (NCCC) at Power Systems Development Facility (PSDF)
Carbon Sequestration
Existing Plants, Emissions, and Capture
Fuel Cells
Fuels
GS Site Characterization
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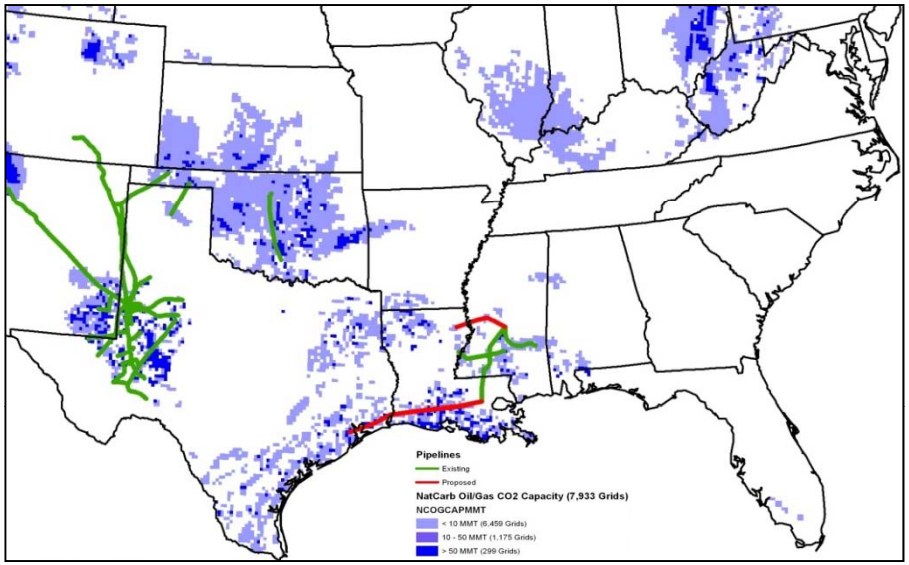
# Large U.S. Reservoirs Amenable to Utilize for $CO_2$ Storage and Enhanced Oil Recovery (EOR)




*Best Practices* ⟷ *Next Generation*

| Cluster | Active Projects | Best Practices, Million Barrels | Next Generation, Million Barrels | Additional Technically Recoverable, Million Barrels |
|---|---|---|---|---|
| Permian | 58 | 13,539 | 22,717 | 9,179 |
| Central Texas | 0 | 6,491 | 9,940 | 3,449 |
| Midcontinent | 8 | 6,365 | 10,165 | 3,801 |
| East Texas | 0 | 4,389 | 7,015 | 2,626 |
| Gulf Coast (non-Texas) | 15 | 4,142 | 5,878 | 1,735 |
| Appalachia | 0 | 1,236 | 1.,944 | 708 |

- **Over 40 years of RD&D history in EOR**
- **The South has Significant Resources**
  - **~50% of national EOR potential**
  - **30+ billion barrels of oil**
  - **10+ billion tonnes of $CO_2$ storage capacity in depleted oil fields**
  - **Near term opportunities for Carbon Capture, Utilization, and Storage**
  - **Can facilitate long-term transition to low carbon energy generation**

# Thank you