



# Southern States Energy Board

## *Securing the Energy Future of the South*

**Presented to:**

The Southern Legislative Conference  
August 16, 2009

**Presented by:**

Kenneth J. Nemeth  
Secretary & Executive Director  
Southern States Energy Board



# Background



*Through innovations in energy and environmental policies, programs and technologies, the Southern States Energy Board enhances economic development and the quality of life in the South.*

*- SSEB Mission Statement*

- **Established 1960, expanded in 1978**
- **16 U.S. States and Two Territories**
- **Each jurisdiction represented by the governor, a legislator from the House and Senate and a governor's alternate**
- **Federal Representative Appointed by U.S. President**



# SSEB Activities Related to Reliable Power Supply

- Southeast Regional Carbon Sequestration Partnership
- **Southern Governors' Energy Sustainability & Climate Initiative**
- American Energy Security Study (Phase Two)
- Water for Energy
- Southern States Biobased Alliance / National biomass Partnership
- Nuclear Energy/ Radioactive Materials Transportation Committees
- Clean Coal Technology and Advanced Power Systems
- CO2 Pipeline and Outer Continental Shelf Study
- Advanced Coal Technology Education and Outreach
- State Energy Planning
- Cyber Security for Energy Infrastructure
- Electric Utility Transmission Planning Issues

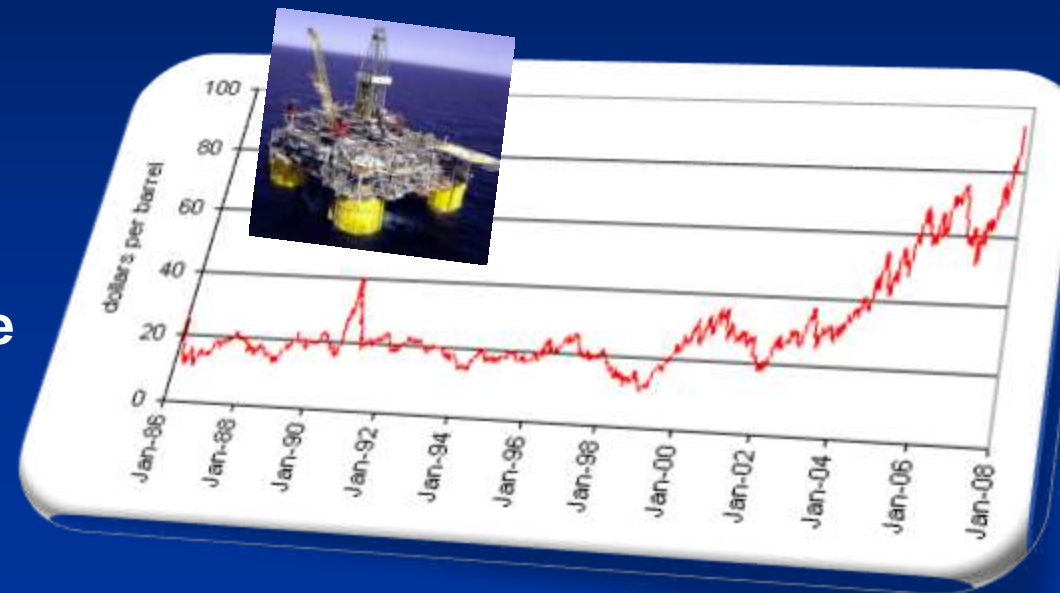


# Current Energy Supply ... at a Crossroads

- Price of Energy
  - Increases
  - Volatility
- Energy Dependency on foreign sources
- Climate Change issues are ratcheting up
- New Administration-outlook for energy
- Energy Policy has become Climate Policy

## Oil Price Volatility

Weekly Price of West Texas Crude



# Significant Global Energy Events

1970

OPEC Sets 55 percent Minimum Tax Rate (1970)

U.S. Institutes Price Controls (1971)

**Arab Oil Embargo Against U.S. (1973)**

Kissinger Announces "Project Independence" (1974)

EPCA Authorizes Strategic Petroleum Reserve (1975)

Windfall Profits Tax (1980)

Iran/Iraq War – Oil Prices Doubled (1978-1980)

1983

**World Oil Glut - \$29 BBL Oil – U.S. Synfuels Shutdown (1983)**

Chernobyl Nuclear Accident (1986)

Alaska's Prudhoe Bay Production Peaks (1988)

**Iraq Invades Kuwait – Prices Soar (\$36 BBL) (1990)**

Clean Air Act – Changes Gasoline & Diesel Fuels (1990)

**U.S. Imports More Oil & Refined Product Than It Produces (1993)**

Asian Financial Crisis – Oil Prices Plummet (1997-1998)

German Government/Utilities Agree to Phase Out of Nuclear Power (2000)

**U.S. Petroleum Consumption – All Time High (19.7 Million BPD) (2001)**

2001

**Terrorist Attacks on the U.S. (2001)**



# Recent Global Energy Events

2004

Foreign Oil Dependence Rises to 65 percent (2004)  
Northeast Blackout Leaves 50 Million People in the Dark  
Natural Gas Prices Triple from 1990 Levels

2005

**Oil Passes \$50/Barrel**

**Gasoline Exceeds \$3/Gallon**

**Hurricanes Damage Oil/Gas Rigs**

Russia Halts Natural Gas to Ukraine

Venezuela Moves to Nationalize Resources

**Oil Breaks \$75/Barrel**

Nigeria Kidnaps Oil Workers

Bolivia Secures Oil Fields

**Experts State Oil Production May Have Peaked**

Iran Threatens Nuclear Capabilities

Saudis Talk of Propping Up \$55 Oil

Chad Orders Chevron to Leave

BP Forced to Repair Pipeline Leaks

China Extends Credit to Oil Nations

Iran, Russia, Others Discuss Gas OPEC

Texas Utilities Cancel 8 of 11 Coal Plants

**Oil Breaks \$144/Barrel**

**Oil returns to \$75/Barrel after fall to mid-30s**

2009



# ***ELECTRICITY:***

## **Electricity Increasingly Important in the 21<sup>st</sup> Century**

### **Examples of electricity's potential this century to address:**

- Energy challenges, electricity use and energy conservation
- Environmental, sustainability and climate change issues
- Economic development
- Transportation issues
- Improving people's standard of living
- Health, medicine and bio-tech
- Continuing developments in communications IT, etc.
- The productivity challenge, electricity use and productivity growth
- Others include: Emerging electro-technologies, new industries, nanotechnology, robotics, superconductivity, space exploration



# Electricity Generation: U.S. Government Forecast

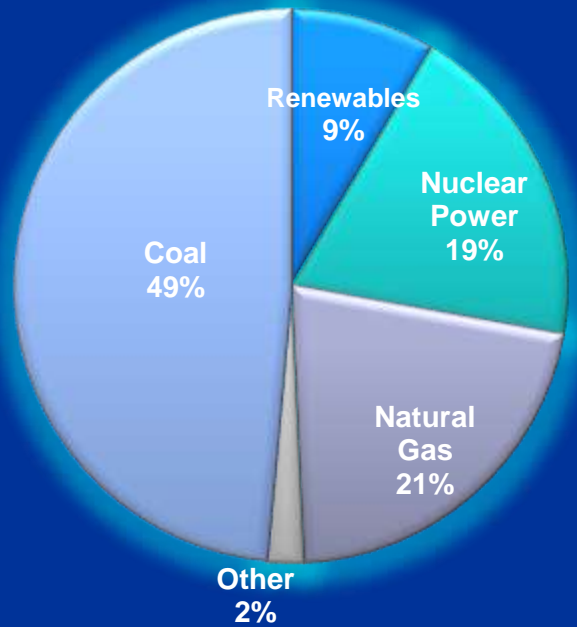
2007  
3903 TWh

26% Growth

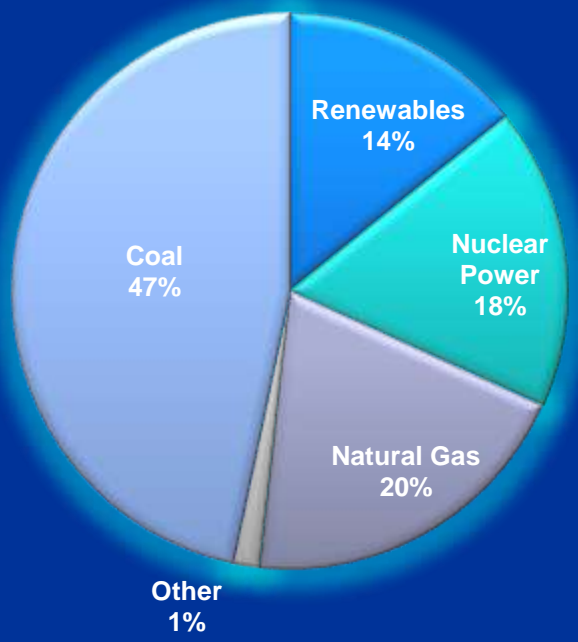
2030  
4902 TWh



2007



2030



*\*Base case from EIA "Annual Outlook 2009"*



# ELECTRICITY:

## Electricity Demand is Outpacing Generation Growth


- **U.S. generation capacity reserve margins have greatly declined**
  - 30-40% in early 1990s
  - 16% in 2008
  - Margins to fall below 13% reference minimum in next 3-5 years in Southeast
- **Generation capacity to grow 5.2% in the next 10 years while demand grows 16.6%**

+5.2%



Growth in U.S. Generating Capacity 2008-17

+16.6%



Growth in U.S. Electricity Demand 2008-17

Source: NERC 2008 Long Term Reliability Assessment, North American Electric Reliability Corporation study



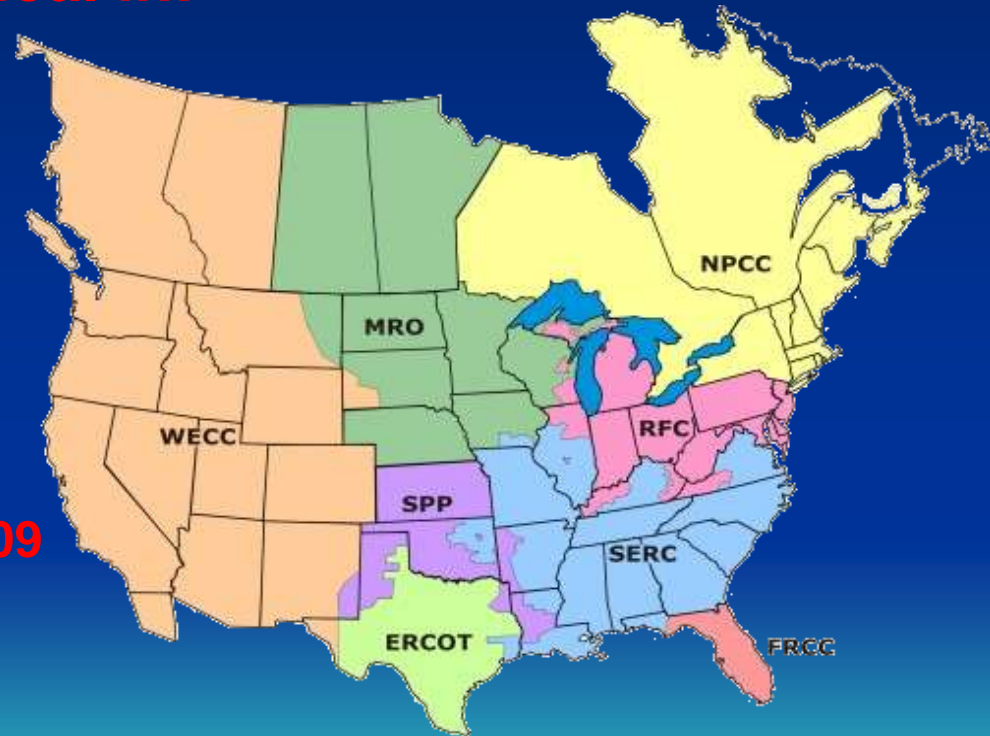
# ***ELECTRICITY:***

## **Situation More Critical in Certain Regions**

***The crisis is approaching!***

**Supply margins become critical in:**

- **SERC (Southeastern): 2010**
- **SPP: 2013**
- **WECC (Rocky Mountain): 2009**
- **ERCOT (Texas): 2014\***
- **California: 2014**
- **NPCC (New England): 2013**
- **Arizona, New Mexico, Nevada: 2009**
- **MRO (Midwest): 2010**



# **ENERGY RESOURCES:**

## **U.S. Resources**

**COAL** - 500 Billion Tons (750,000 Billion BBLs/OIL)

**BIOMASS** - 1.3 Billion Tons (4.5 Million BBLs/OIL/Day)

**OIL SHALE** - 1+ Trillion BBLs/OIL SHALE LIQUID FUELS

**NATURAL GAS** - 1600+ Trillion cubic feet

**WIND** - 860 TWh - 300 GW of wind capacity (20% by 2030 goal)

**SOLAR** - 600 TWh - 165 GW by 2025 (example California 3 GW Solar Million Homes Program)

**ENERGY EFFICIENCY** - 980 Twh (by 2025)



# **ENERGY RESOURCES:**

## **Global Energy Forms Face Limits in Supply & Price**

### *All Energy Forms Needed for Diversity of Supply*

- **ENERGY EFFICIENCY/DEMAND-SIDE MANAGEMENT/CONSERVATION:** *An important resource but insufficient to power the future*
- **OIL:** *Consistently above \$50/barrel; declining reserves; risky sources*
- **NUCLEAR:** *Valuable but constrained due to safety and waste disposal concerns*
- **HYDRO:** *No growth in supply*
- **WIND:** *Limited availability; grid disruptions; erratic supply*
- **ETHANOL:** *Clean but energy inefficient; cellulosic key*
- **NATURAL GAS:** *Price volatility; declining reserves; risky sources*
- **COAL:** *Faces GHG, climate change, regulators, environmental organizations challenges*
- **SOLAR:** *Cost of materials; regional effectiveness; intermittent*

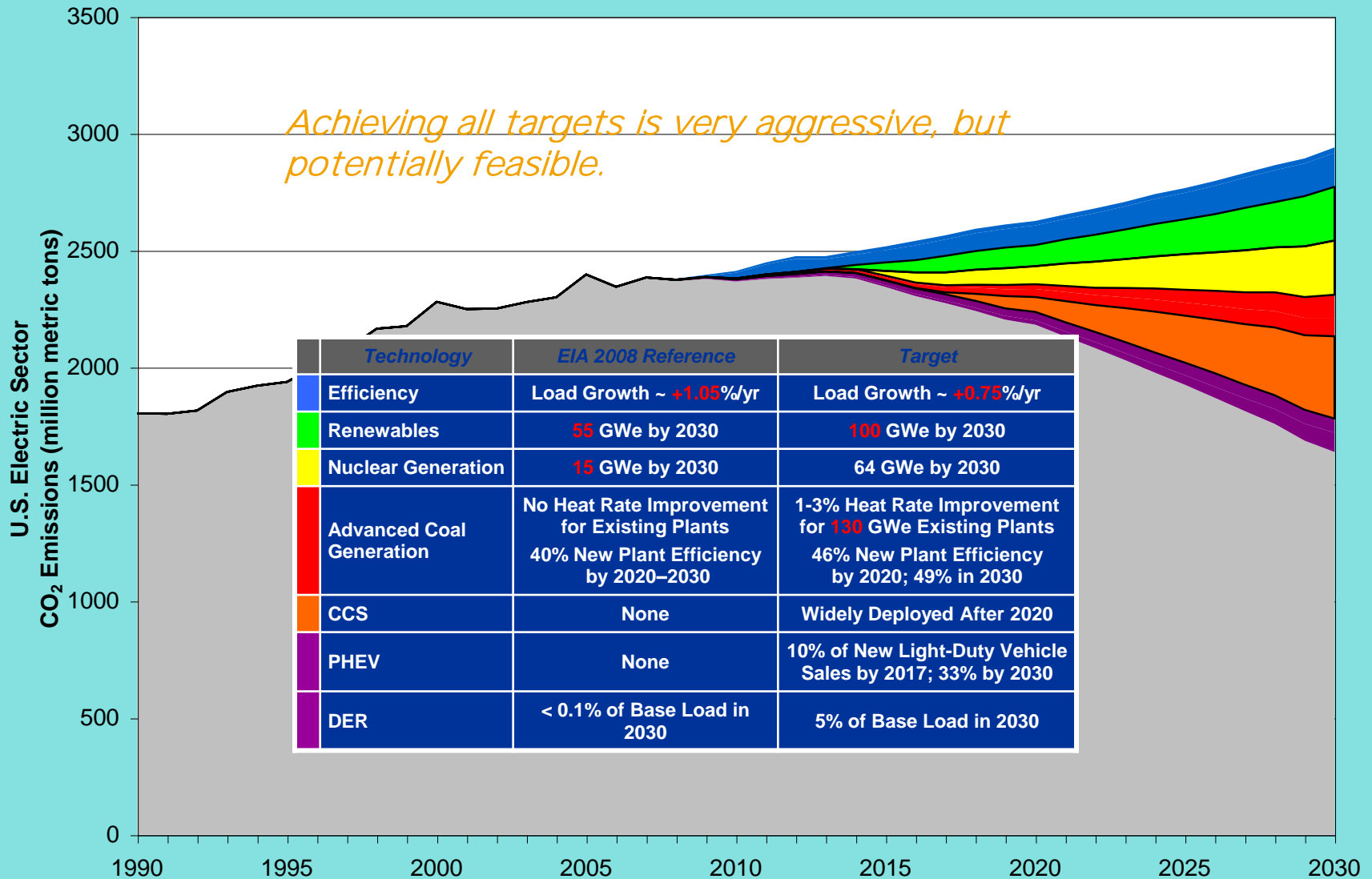


# Meeting Future Electricity Needs - Barriers

- **Impact of Environmental Initiatives**
  - Fuel switch from coal to gas
  - Need effective integration & verification of demand-side resources (Demand response projected to offset ~80% peak growth in 2016)
  - Continued Uncertainty on environmental requirements
- **Lack of Transmission infrastructure**
  - Getting renewables to market (750% growth in wind by 2017, eg)
  - Transmission miles inadequate (9.5% increase from 2008-2017)
  - Smart grid technologies needed
  - Transmission planning more complex with intermittent resources
- **Financeability and Financing new infrastructure**
  - Cost uncertainty
  - Environmental Regulation uncertainty
  - Capability of Financial markets
    - Reduced investment capital & increase in risk

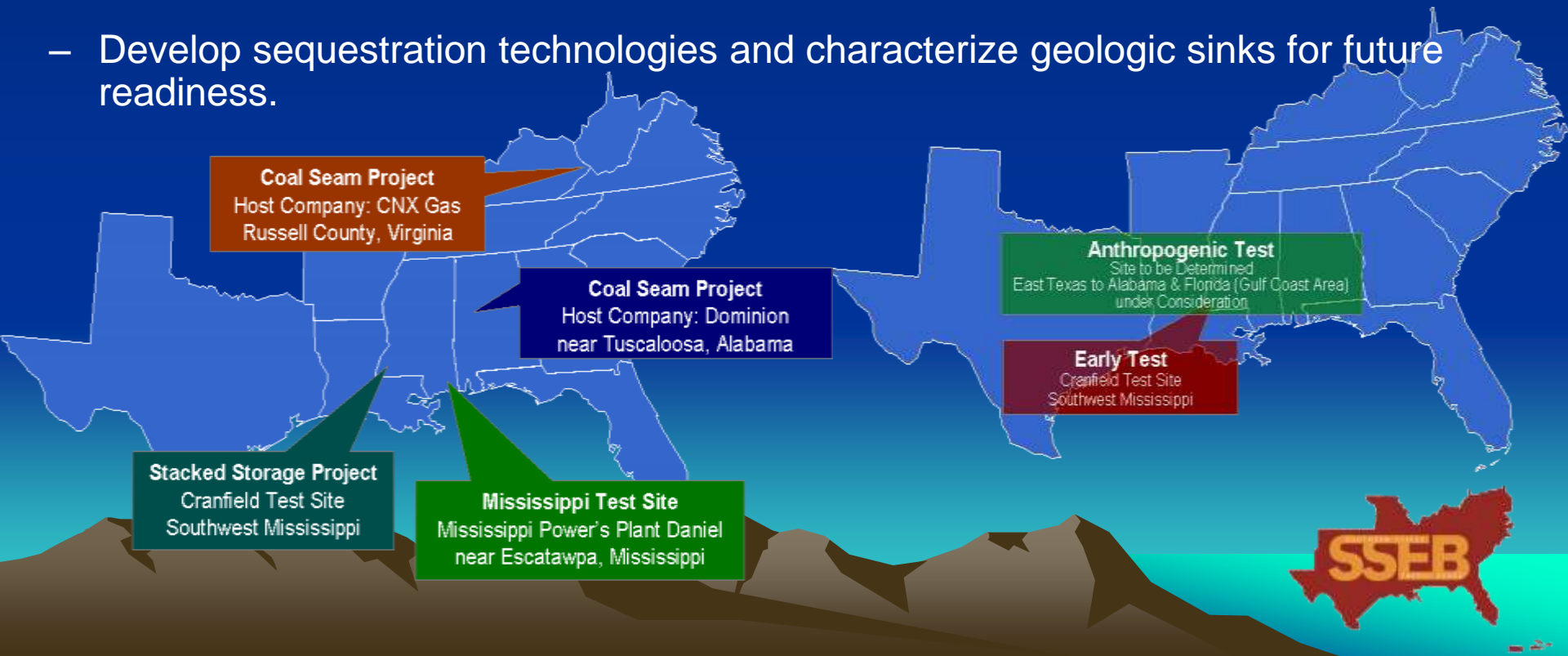


# CO<sub>2</sub> Reductions... Technical Potential



# CLIMATE: SECARB Partnership Objectives

- Characterize the potential carbon sequestration sinks in the Southeast;
- Conduct field verification studies in the most promising geologic formations in the region;
- Advance the state of the art in monitoring, measurement and verification techniques and instrumentation; and
- Develop sequestration technologies and characterize geologic sinks for future readiness.



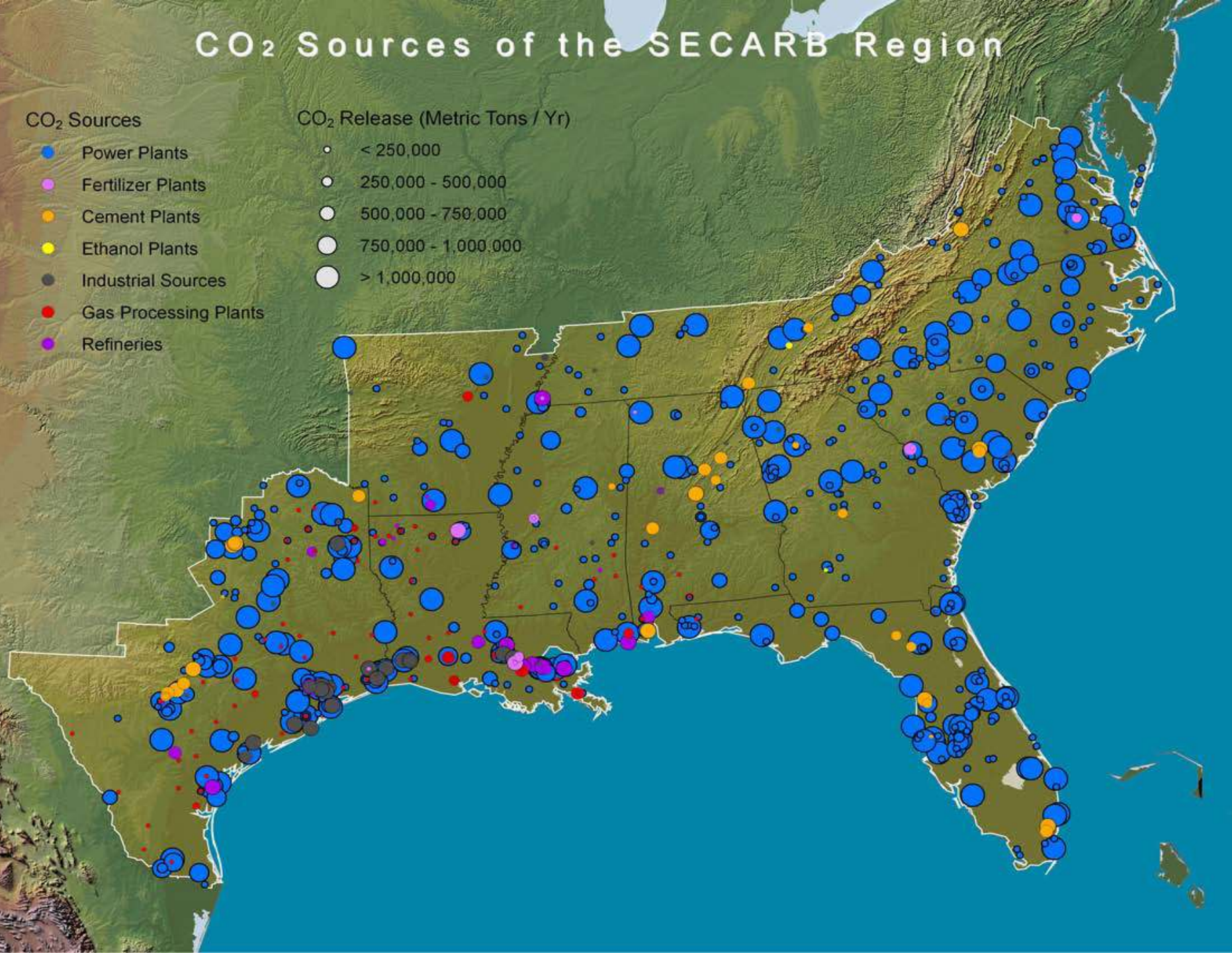
# CO<sub>2</sub> Sources of the SECARB Region

## CO<sub>2</sub> Sources

- Power Plants
- Fertilizer Plants
- Cement Plants
- Ethanol Plants
- Industrial Sources
- Gas Processing Plants
- Refineries

## CO<sub>2</sub> Release (Metric Tons / Yr)

- < 250,000
- 250,000 - 500,000
- 500,000 - 750,000
- 750,000 - 1,000,000
- > 1,000,000



# Strategies for Commercialization of Carbon Capture & Storage

- R&D Program focused on CCS
- 15 GW pioneer plant program
- 45 GW early adopter program
- CCS retrofit program
- Legal & regulatory framework for legal, land use, permitting, liability issues for transport and long term storage of CO<sub>2</sub>

\* Ben Yamagata, Coal Utilization Research Council



# Reducing Energy Demand: The Low Hanging “Fruit”

- ❖ Renewable portfolio standards
- ❖ Efficiency standards for boilers, appliances, electronics
- ❖ Building code upgrades
- ❖ Tax incentives for “green” buildings
- ❖ Expedited permits
- ❖ Weatherization
- ❖ Improve energy performance in government buildings
- ❖ Alternative fueled government vehicles



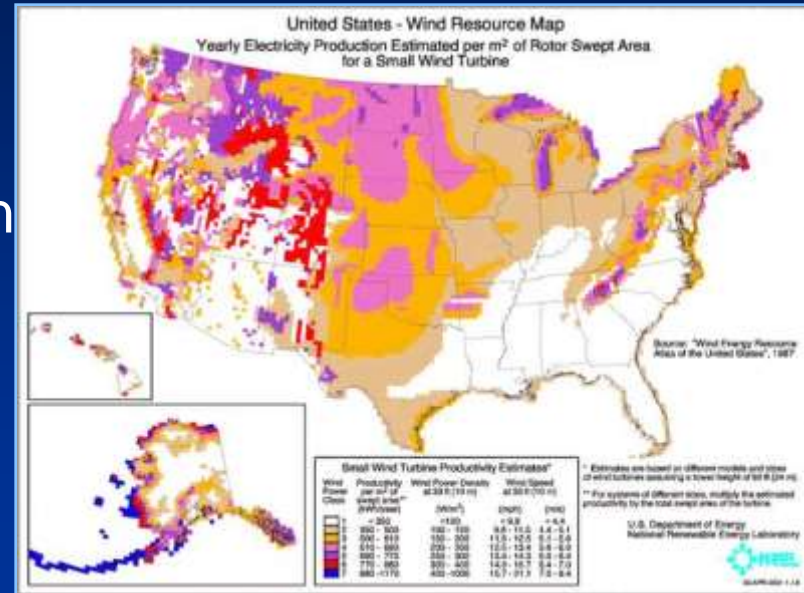
# Energy Efficiency/Renewables in the Southeast

- ❖ Efficiency in existing assets
  - Transmission
  - Generation
- ❖ States with Renewable Electricity Standards
  - North Carolina
  - Texas
  - Florida
  - Virginia
- ❖ Energy Efficiency Standards in Maryland
- ❖ Save-a-Watt program in the Carolinas
- ❖ Tennessee Valley Authority programs
- ❖ Green Power programs – TVA, GA e.g.
- ❖ Local municipalities activities
- ❖ Industry leadership



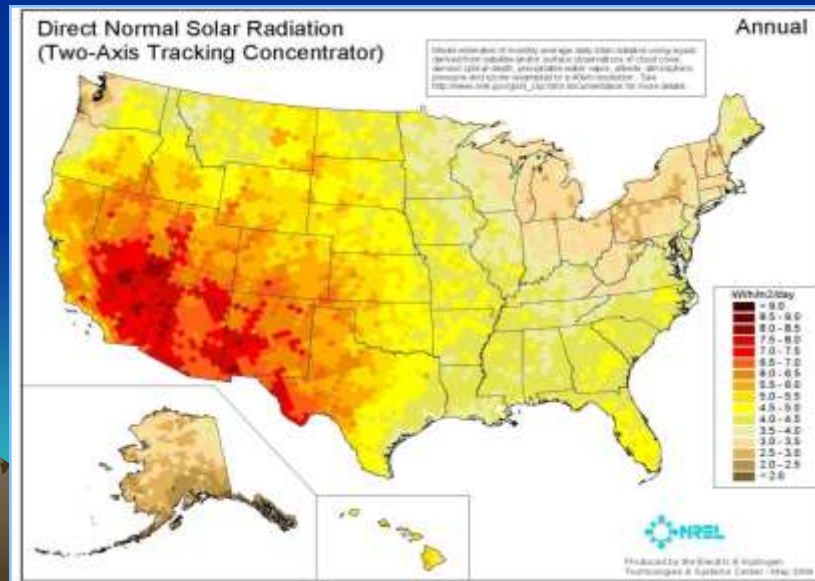
# Wind

- ❖ Map shows potential for wind generation
- ❖ Wind Speed is Key
- ❖ 10,000 MW in US
- ❖ Turbines typically run 25-35% of the time
- ❖ Transmission issues
- ❖ Southeast examples
- ❖ Georgia Tech and Southern Company Study:
  - Need more data
  - Hurricanes
  - Potential of 50-160 MW



# Solar

- ❖ Map shows potential for solar energy
- ❖ Cloud Cover and Darkness key
- ❖ Southwest – 500 MW plants
- ❖ Southeast :
  - ❖ FPL Group – 110 MW @ 3 sites and 75 MW PV solar plant
  - ❖ Duke Energy (NC)– 16 MW PV Solar farm plus 10 MW solar energy system



# Combined Heat & Power Applications

## ❖ CHP role in the Southeast

- Southeast: 13,000 MW at 261 sites
- Mississippi: 565 MW at 20 sites

## ❖ Large CHP Applications

- Chevron Oil Refinery, Pascagoula- 147 MW
- Weyerhaeuser, Columbus – 123 MW
- Georgia Pacific, New Augusta- 60 MW
- International Paper, Natchez- 53 MW

## ❖ Types of Applications

- Pulp and Paper
- Refining
- Chemicals

## ➤ Barriers to reaching potential

- Few technology improvements needed
- Low electricity prices
- Awareness of potential



# The Dash to Gas

- Natural Gas is replacing Coal as base load generating option
  - Short lead time
  - Easier to site
  - Lower carbon emissions
  - Lower capital costs
  - Small increments of capacity
- Issues
  - Natural gas supply security
  - Gas price volatility
  - Stress of gas supply and transportation infrastructure
  - Switch to gas could change transmission flow patterns



# Status of Coal-Fired Power Plants in the U.S.

- 110 coal-fired projects underway (52 progressing / 58 announced : 64,000 MW )
- Coal Plant construction lagging – Actual << Planned (2002 Report)
  - Plan for 2007 = 36,000 MW
  - Actual 2007 = 4,500 MW
- Delays, Cancellations
  - Regulatory Uncertainty, Climate Change
  - Economics, escalating costs
  - Backlog of plants in queue
- Recent completions
  - Wygen II (Wyoming) 90 MW
  - Weston (Wisconsin) 500 MW
- 1990-2007 Averaged ~ 1000 MW/ year in U.S.
  - Skilled resources reduced
  - Scarcity of labor in power plant engineering, procurement, project management, construction activities
- Impact of Coal Ash Spill at TVA plant (Kingston)
- Georgia example of Intervention for CO2 Controls



# Blueprint for 100 New Nuclear Plants in 20 Years- Lamar Alexander

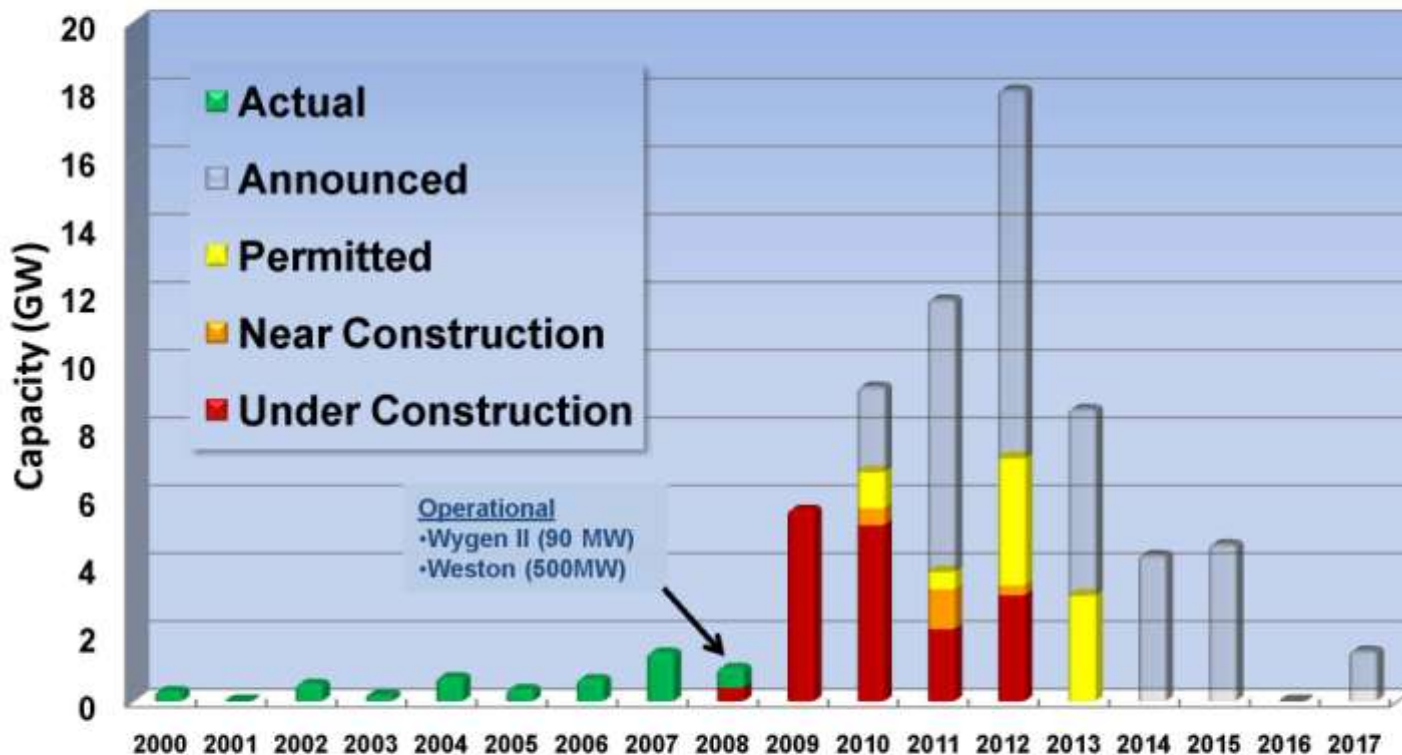
- **Low Cost Clean Energy Plan**
  - Build 100 nuclear power plants in 20 years
  - Electric cars
  - Offshore exploration for natural gas & oil
  - Double energy R&D for renewable energy
- **Why aren't we building nuclear capacity?**
  - Nuclear is very clean & unique energy source
  - Nuclear power plants are safe
  - Nuclear plants can be insured



# Future Generating Capacity

## Current Capacity Additions by Years

Figure 2



# Update on Electricity Issues in the 111<sup>th</sup> Congress

- **Stimulus Funding**
  - Energy Efficiency and Renewable Energy - \$17 Billion
  - Electricity Delivery, Reliability, Fossil Energy - \$22 Billion
- **Waxman-Markey Highlights- American Clean Energy & Security Act**
  - Title I. Clean Energy
    - Energy Efficiency & Renewable Electricity Standard
    - CCS
    - Smart Grid, Transmission Planning
    - Nuclear Guarantee programs
  - Title II. Energy Efficiency Buildings
  - Title III. Reducing Global Warming Pollution
    - Cap and Trade
    - Offsets
  - Title IV. Transitioning (Competitiveness, Green jobs)
- **Senate Updates to American Clean Energy & Security Act**
  - Carbon Storage Stewardship Trust Fund Act – Proposal for Senate bill



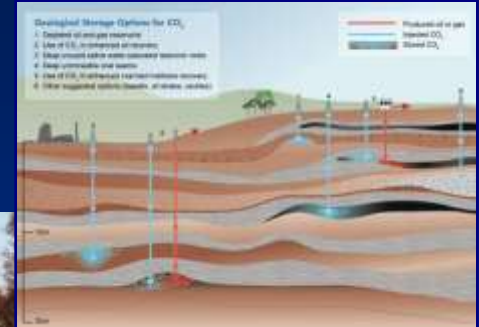
# Transition Plan for Securing America's Energy Future - "13 Principles" from US Chamber of Commerce

- Promote Energy Efficiency
- Reduce environmental impacts of consumption/production
- Climate science to guide energy & environmental policy
- RD&D and deployment of advanced clean energy technology
- Expand oil/gas exploration & production
- Expand nuclear energy
- Clean coal
- Renewables
- Transform transportation sector
- Modernize energy infrastructure
- Shortages of energy professionals
- Reduce litigation opportunities & regulation
- Demonstrate global leadership on energy security & climate change



# Roles of the South in Securing its Energy Future

- Energy Efficiency
- Combined Heat & Power
- Building Codes
- Energy Star Programs
- Carbon Capture & Storage Infrastructure
- Low-Carbon Energy Source Development
- Transmission Infrastructure
- Renewable Energy Zones





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