Southern States Energy Board

“Energy Security For America’s Future”

Presented at:
West Virginia Energy Summit
December 9, 2008

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

- 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

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
Establish an ambitious goal for the Nation
Frame a plan for success
Model the benefits of achievement v. the greater costs of inaction
Formulate legislative recommendations to support the plan
AES Study’s Focus

- Oil market analysis and forecasts
- U.S. resource assessment of biomass, coal, oil shale and CO$_2$ enhanced oil recovery (EOR)
- Technology assessments and cost estimates for biomass, coal and oil shale-to-liquid fuel production plants and CO$_2$ EOR
- Forecasts and analysis of the U.S. economy
- Environmental challenges and benefits
- Policy recommendations to stimulate growth of the alternative liquid fuels
Impacts on Variables of Interest

- GDP, inflation and interest rates
- Oil imports
- Price and price volatility of liquid fuels
- Federal, state and local government revenues
- Federal budget deficit
- U.S. trade deficit ($720 Billion in 2008)
- Industry sales and profits
- Employment created (industries and occupations)
- Capital formation and requirements
- Export opportunities
- Personal income
Serious Oil Risks to America

- Excessive dependence on imported oil from OPEC and others.
- World oil supply is not keeping up with demand.....“peak oil?”
- Increased global competition from China, India and others.
- Supply disruptions by natural disasters or terrorism.
- Environmental consequences.
- U.S. energy and economic security is increasingly at risk
- Military preparedness and homeland defense requires secure fuel sources
- Replace aging energy workforce
American’s Oil Consumption 22 Million Barrels a Day

<table>
<thead>
<tr>
<th>Use by Sector</th>
<th>Percent of Total*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation fuels</td>
<td>67 %</td>
</tr>
<tr>
<td>Industrial</td>
<td>25 %</td>
</tr>
<tr>
<td>Residential</td>
<td>4 %</td>
</tr>
<tr>
<td>Commercial</td>
<td>2 %</td>
</tr>
<tr>
<td>Electricity generation</td>
<td>2 %</td>
</tr>
</tbody>
</table>
America’s Vulnerability to Imported Oil (60%)

2004
- Bin Laden – “Bleed Until Bankruptcy” Plan
- Oil - Military target for the first time

2005
- Saudi Arabia
  - Critical Target - 25% of Proven World Oil
  - 10 Million BBLs/ day
  - 1.5 Million bbs/ day Excess Capacity
  - September - al-Dammam seaport hub attack

2006
- February
  - Abqaiq Refinery – Attack
  - 2/3 of Saudi Oil Processed
  - Aramco vehicles and uniforms used
  - If successful – world oil panic

2008
- Saudi’s Pledge extra 200,000 BBLs/day in July
- Movement for the Emancipation of the Niger Delta (MEND)
  - Attacks on Shell & Chevron facilities
- Nigeria’s oil output – cut by 400,000 BBLs/ day
America’s Vulnerability to Imported Oil

Gal Luft Congressional Testimony:

- With oil at $200 BBL, OPEC can:
  - buy Bank of America in one month’s production
  - buy Apple Computer in a week
  - buy General Motors in 3 days
  - buy 20% of every S&P 500 Company in 18 months

- “Sovereign Wealth Funds”
  - controlled by despots hostile to America
  - $$$ for oil
  - finance terrorism
  - build nuclear weapons
## U.S. Imports of Petroleum (Top 15 Countries)

*(Thousand Barrels Per Day as of April 2005)*

<table>
<thead>
<tr>
<th>Country</th>
<th>Apr-05</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>CANADA</td>
<td>2,190</td>
<td>18.55%</td>
</tr>
<tr>
<td>MEXICO</td>
<td>1,632</td>
<td>13.82%</td>
</tr>
<tr>
<td>VENEZUELA*</td>
<td>1,567</td>
<td>13.27%</td>
</tr>
<tr>
<td>SAUDI ARABIA*</td>
<td>1,494</td>
<td>12.65%</td>
</tr>
<tr>
<td>NIGERIA*</td>
<td>1,243</td>
<td>10.53%</td>
</tr>
<tr>
<td>RUSSIA</td>
<td>645</td>
<td>5.46%</td>
</tr>
<tr>
<td>IRAQ*</td>
<td>542</td>
<td>4.59%</td>
</tr>
<tr>
<td>ALGERIA*</td>
<td>467</td>
<td>3.95%</td>
</tr>
<tr>
<td>UNITED KINGDOM</td>
<td>394</td>
<td>3.34%</td>
</tr>
<tr>
<td>ANGOLA</td>
<td>365</td>
<td>3.09%</td>
</tr>
<tr>
<td>VIRGIN ISLANDS</td>
<td>358</td>
<td>3.03%</td>
</tr>
<tr>
<td>ECUADOR</td>
<td>261</td>
<td>2.21%</td>
</tr>
<tr>
<td>NORWAY</td>
<td>250</td>
<td>2.12%</td>
</tr>
<tr>
<td>COLOMBIA</td>
<td>237</td>
<td>2.01%</td>
</tr>
<tr>
<td>KUWAIT*</td>
<td>164</td>
<td>1.39%</td>
</tr>
</tbody>
</table>

*Total: 11,809 100.00%
Military expenditures tied to defending Persian Gulf oil ($135 billion annually)

Lost employment/investment from diversion of financial resources ($170 billion annually)

Cost of periodic “oil shocks” (> $300 billion / year)

Erosion of U.S. industrial base (2.7 million jobs lost since 1991)

2008 U.S. Trade Deficit ($720 billion)
AES Response to Serious Oil Risks

AES plan provides national security through consistent, domestic supplies
AES plan allows us to make our own fuels and control our own destiny (stable fuel prices)
AES plan employs existing and rapidly emerging technologies, creating fuels that have a long shelf life, compared to gasoline, and are environmentally sound
Policy Recommendations
From American Energy Security Study I

Reduced Policies

- End the $.50 per gallon Alternative Liquid Fuels Excise Tax Credit
- Provide explicit DOE authority and appropriations for loan guarantees
- Authorize and fund the DoD Alternative Fuels Testing and Development Program

Policy Recommendations for Congressional Consideration

- Provide accelerated cost recovery to alternative fuel plant owners
- Incentivize refining of alternative liquid fuels
- Authorize and fund military purchases of alternative fuels under long-term contract
AES Policy Recommendations (continued)

- Eliminate the $10 million cap for tax exempt Industrial Development Bonds
- Provide regulatory streamlining for the production of alternative liquid fuels and for mine permitting
- Establish a self-sustaining government corporation to provide market risk insurance
- Expand the Strategic Petroleum Reserve (SPR) program to include alternative liquid fuels products
- Provide incentives for existing ethanol plants to convert to coal
- Provide incentives for enhanced oil recovery (EOR), enhanced gas recovery (EGR) and enhanced coalbed methane recovery using CO$_2$ captured from alternative fuel plants
American Energy Security Study II

Initiated in August 2008 by West Virginia Governor Joe Manchin, Chair of the Southern States Energy Board
Strategic Action Plan – Energy Supply Blueprint
Focus on 4 areas impacting American economy:

- **Energy Resources**
- **Electricity**
- **Climate**
- **Transportation Fuels**
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:

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: Consistently above $6/mcf; declining reserves; risky sources

COAL: Faces GHG, climate change, regulators, environmental organizations challenges

SOLAR: Cost of materials; regional effectiveness; intermittent
Solar

- Map shows potential for solar energy
- Cloud Cover and Darkness key
- Examples in Southwest
- Southeast – solar rooftop systems
- FP&L discussing a 200-300 MW plant
- Duke Energy – Delays Solar Thermal
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
  - Rulemaking in 2008
  - Hurricanes
  - Potential of 50-160 MW
ELECTRICITY:
Electricity Will Be Increasingly Important in the 21st 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: Emerging electro-technologies, new industries, nanotechnology, robotics, superconductivity, space exploration, etc…
Electricity Demand is Outpacing Generation Growth

U.S. baseload 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 years while demand grows 16.6%

Growth in U.S. Electricity Demand 2008-17
Growth in U.S. Generating Capacity 2008-17

Source: NERC 2008 Long Term Reliability Assessment,
ELECTRICITY:
Situation More Critical in Certain Regions

Hydro margins become critical in:
- ERC (Southeastern): 2010
- P: 2013
- RCC (Rocky Mountain): 2009
- RCOT (Texas): 2013
- California: 2014
- SPP (New England): 2013
- Arizona, New Mexico, Nevada: 2009
- ERCOT (Midwest): 2010

Source: NERC 2007 Long-Term Reliability Assessment, October 2007
ELECTRICITY:
Projected Electricity Needs in the U.S.

- EIA has forecast need for 135,000 MW of new generation over next 10 years
- Most of this new generation required is base-load capacity
- Base-load capacity = nuclear, coal or gas
- Base-load capacity does not = renewable
- Base-load capacity can only slightly be offset with energy efficiency programs
ELECTRICITY:
Prospects for Base-Load

- Where will 135,000 MW of new base-load capacity over next 10 years come from?
- Won’t be nuclear - next round of nuclear plants not likely to come on-line until 2017 or later
- May not be coal - if environmental litigation and CO₂ debates continue to stymie development
- Can’t completely come from natural gas - not enough U.S. production to fuel all base-load needs; not enough LNG imports to fill void
- Can’t be renewables-intermittent, not base-load
- Can’t conserve our way out of all incremental needs
CLIMATE:
Climate Change Responses

- Kyoto Protocol
  - Threat of CO₂ in the atmosphere
  - Global solution

- Copenhagen “Summit”

- Independent U.S. Responses
  - Regional Emissions Trading initiatives
  - Carbon Markets- Emissions Auctions (RGGI 9/25/08, e.g.)
  - Chicago Climate Exchange
  - Southern Governors Initiative
  - Mayors’ Climate Protection Agreement
  - EPA Proposed rule on GHG Under Clean Air Act
  - Federal Cap and Trade legislation
CLIMATE: Concerns Facing Climate Change Actions

- Challenges to IPCC Report
- Greenspan warns against Cap and Trade
  - “No effective way to meaningfully reduce emissions without negatively impacting a large part of an economy .... Permits will become expensive and large numbers of companies will experience cost increases that make them less competitive. Jobs will be lost and real incomes of workers constrained.”
- Regional electricity reliability concerns increase as legislation approaches
**CLIMATE:**

**Responsible Climate Change Legislation**

- **Senators Offer ‘Responsible Plan’**
  - Prevent economic harm
  - Promote new technologies
  - Treat states equitably
  - Tax revenue accountability

- **Alternatives to Lieberman-Warner**
  - Develop Carbon Capture & Storage (CCS) technology
    - Create national funding mechanism for RD&D
  - Accelerate new nuclear deployment
  - Accelerate renewable energy storage R&D
  - Capture cost-effective energy efficiency & renewable options
Potential Climate Change Agenda in New Administration

**President-elect Obama**
- Engaging as World Leader
- Cap & Trade - 80% Reductions of CO₂ by 2050
- Investments in R&D - $15 Billion/year
- Key Principles
  - Reduce Foreign Oil
  - Clean Energy Future
  - Transform to Green jobs

**Congress**

- Senate
  - Lieberman-Mc McCain plan
  - Boxer Cap & Trade bill with funding for renewables
    - *"We need to make it clear. We can't turn our back on [coal]."*
    - {Barbara Boxer-Platts Inside Energy, November 20, 2008}
  - Attendance at Poznan, Poland UN Climate Change Conference

- House
  - Waxman & the Energy Committee
  - Select Committee on Energy Independence & Global Warming to continue in 111th
CLIMATE:

The U.S. Has Ample Room for Carbon Sequestration

Geological Storage Options for CO₂
1. Depleted oil and gas reservoirs
2. Use of CO₂ in enhanced oil recovery
3. Deep unused saline water-saturated reservoir rocks
4. Deep unmineable coal seams
5. Use of CO₂ in enhanced coal bed methane recovery
6. Other suggested options (basalts, oil shales, cavities)

DOE: Storage Potential of 2.5 Trillion Tons

Courtesy: Energy Information Administration
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.
CLIMATE:
Positive Signs for Coal with Carbon Capture and Storage

- CCS Regional Partnerships
- Making Methanol from CO₂ and Hydrogen
- Enhanced Oil Recovery
- Enhanced Coal Bed Methane Recovery
- CO₂ Feedback for biofuels algae
- Making CTL from coal
- Regulatory Legislation modeled in Wyoming, Colorado (IOGCC)
- State and regional infrastructure development (CCS, CTL, Methanol)
TRANSPORTATION:
Coal Continues as Key to U.S. Energy Security and Independence

Eliminating U.S. Oil Imports by 2030 - Southern States Energy Board, 2006

Diagram showing projected oil production and import gap from 2007 to 2029, with key technologies such as Coal-to-Liquids (29%), Oil Shale (16%), Enhanced Oil Recovery (EOR), Biomass, and CTL.

Key points:
- Coal-to-Liquids is projected to contribute 29% of the total oil production by 2029.
- Oil Shale is expected to contribute 16% of the total production.
- Enhanced Oil Recovery (EOR) is also shown, though its contribution is less significant compared to the other technologies.
- Biomass and CTL contributions are indicated but are not as prominently shown in the diagram.
- The import gap is projected to decrease significantly from 2007 to 2029, with a steep decline after 2013.

The diagram illustrates the potential role of different technologies in reducing the U.S. dependence on oil imports, aligning with the Southern States Energy Board's goal of eliminating imports by 2030.
CO₂ – EOR

- The United States has over 87 billion barrels of “stranded oil” recoverable through CO₂-EOR (DOE, 2008)
- “Availability of CO₂ limits the industry’s ability to expand CO₂-EOR” (Charles Fox, Vice President, Kinder Morgan, 2008)
- “…efficient capture and separation of by-product CO₂ from the next generation of low emission power plants could provide massive, long-term sources of “EOR-Ready CO₂” (DOE, 2006)
- In 1985, the United States produced 9 Mb/d of oil and imported 5 Mb/d. In 2005, we produced 5 Mb/d and imported almost 14 Mb/d.
Two million barrels/day CO₂-EOR could…
U.S. has over 87 billion barrels of stranded oil recoverable through CO$_2$-EOR.
CO₂ - EOR could provide over 40 years of current U.S. production

Currently Recoverable CO₂ - EOR
87 Billion Barrels Per Year

2 Billion Barrels Per Year

The U.S. Strategic Petroleum Reserve: 700 V.B. days
PoGo:

WE HAVE MET THE ENEMY AND HE IS US

Walt Kelly
A Path Forward for Indigenous Energy Resources

- Workforce – Kentucky Coal Academy
- Help fund R&D for clean coal & sequestration
- Advocate for renewable energy tax credit extension
- Consider funding renewables and other Carbon offset programs
- Nuclear Generation with spent fuel storage
- Involvement in policy decisions at federal & state levels
- Promote Advanced Technologies
- Financing/Investment & Regulatory certainty

- Coal generation with 90%+ CO₂ capture/storage
- Indigenous liquid transportation fuels (coal, biomass, oil, shale) with carbon sequestration to eliminate dependence on imported oil
- Modernized infrastructure (pipelines, expanded refineries, transmission, roads, bridges, etc.)
- Energy Efficiency in existing energy infrastructure and in end-use, including CHP
Mr. Kenneth J. Nemeth, Secretary

Southern States Energy Board
nemeth@sseb.org
(770) 242-7712

PLEASE VISIT:

www.sseb.org
www.americanenergysecurity.org
www.sercarbon.org