REINHOLD ENVIRONMENTAL Ltd.

2015 APC Round Table & Expo Presentation

July 13 & 14, 2015, in Atlanta, GA / Hosted by Southern Company

A Future Perspective of the Utility Industry

Given the Current and Pending Regulations

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Chief Environmental Officer
Senior Vice President

July 13, 2015

SOUTHERN COMPANY

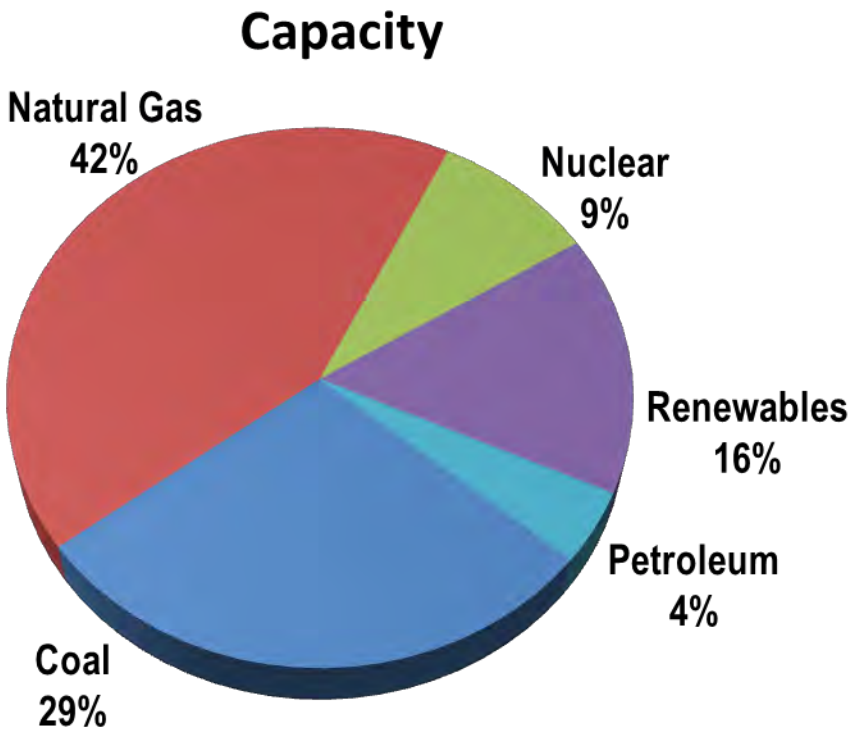
Need a Full Portfolio of Energy Resources

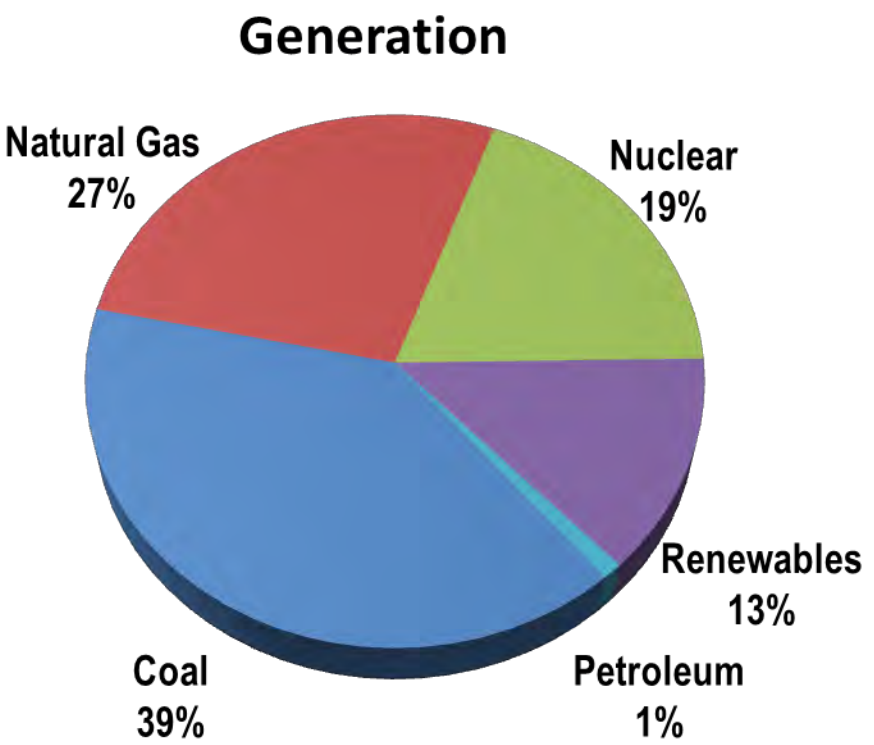
- 21st Century Coal
- Nuclear
- Natural Gas
- Renewables
- Energy Efficiency

> "Many of you've heard me speak before about the full portfolio and its significance to Southern Company and to our industry as a whole, simply put, we are inventing the future of clean, safe, reliable and affordable energy for the benefit of the customers and communities we serve. Our full portfolio strategy which includes ***new nuclear*** and innovative new technologies for ***21st century coal***, as well as ***natural gas***, ***renewables*** and ***energy efficiency*** is a fundamental component of that mission."
>
> ***Tom Fanning***
> *Chairman, President & CEO*
> *Southern Company*

- Each of these sources have unique benefits as well as challenges.
- Need a national, robust research, development, and demonstration effort to create new technologies for the future.

U.S. Installed Electric Generating Capacity and Actual Generation Delivered, 2013

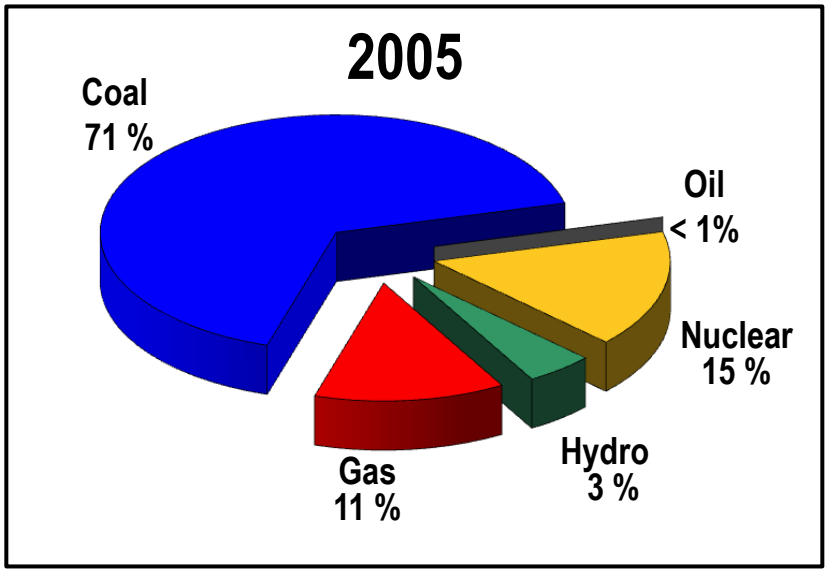


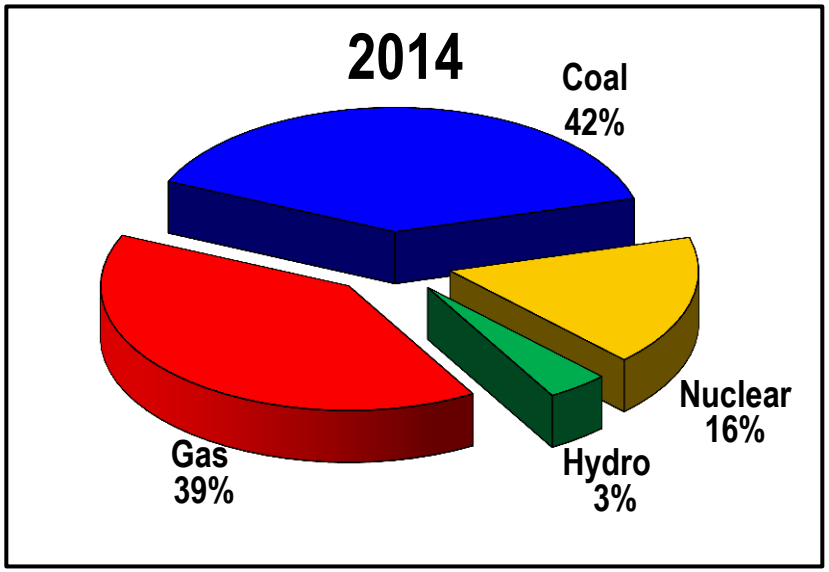


Notes: Natural gas includes combined cycle, combustion turbine and other gas-fired systems. Renewables includes conventional hydro and pumped storage.

2013 Capacity: http://www.eia.gov/electricity/annual/html/epa_04_03.html
2013 Generation: http://www.eia.gov/forecasts/aeo/section_elecgeneration.cfm

Southern Company Generation Mix
2005 and 2014





Source: Southern Company Form 10K filings

Major Environmental Regulatory Challenges

National Ambient Air Quality Standards (NAAQS)

- Ozone
- Particulate Matter
- Sulfur Dioxide (SO_2)
- Nitrogen Dioxide (NO_2)
- Lead
- Carbon Monoxide (CO)

CSAPR

- Sulfur Dioxide (SO_2)
- Nitrogen Oxides (NO_X)

Greenhouse Gases (GHGs)

- Permitting Requirements
- New and Modified/Reconstructed Source Performance Standards
- Existing Source Guidelines

Mercury and Air Toxics Standards (MATS) (Compliance by 2015/2016)

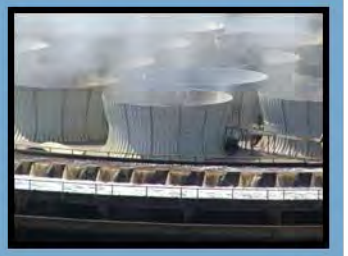
- Mercury
- Acid Gases
- Metals / Particulate Matter

Visibility and Regional Haze

- Sulfates
- Nitrates
- Particulate Matter

316(b) / Effluent Guidelines / Waters of the US

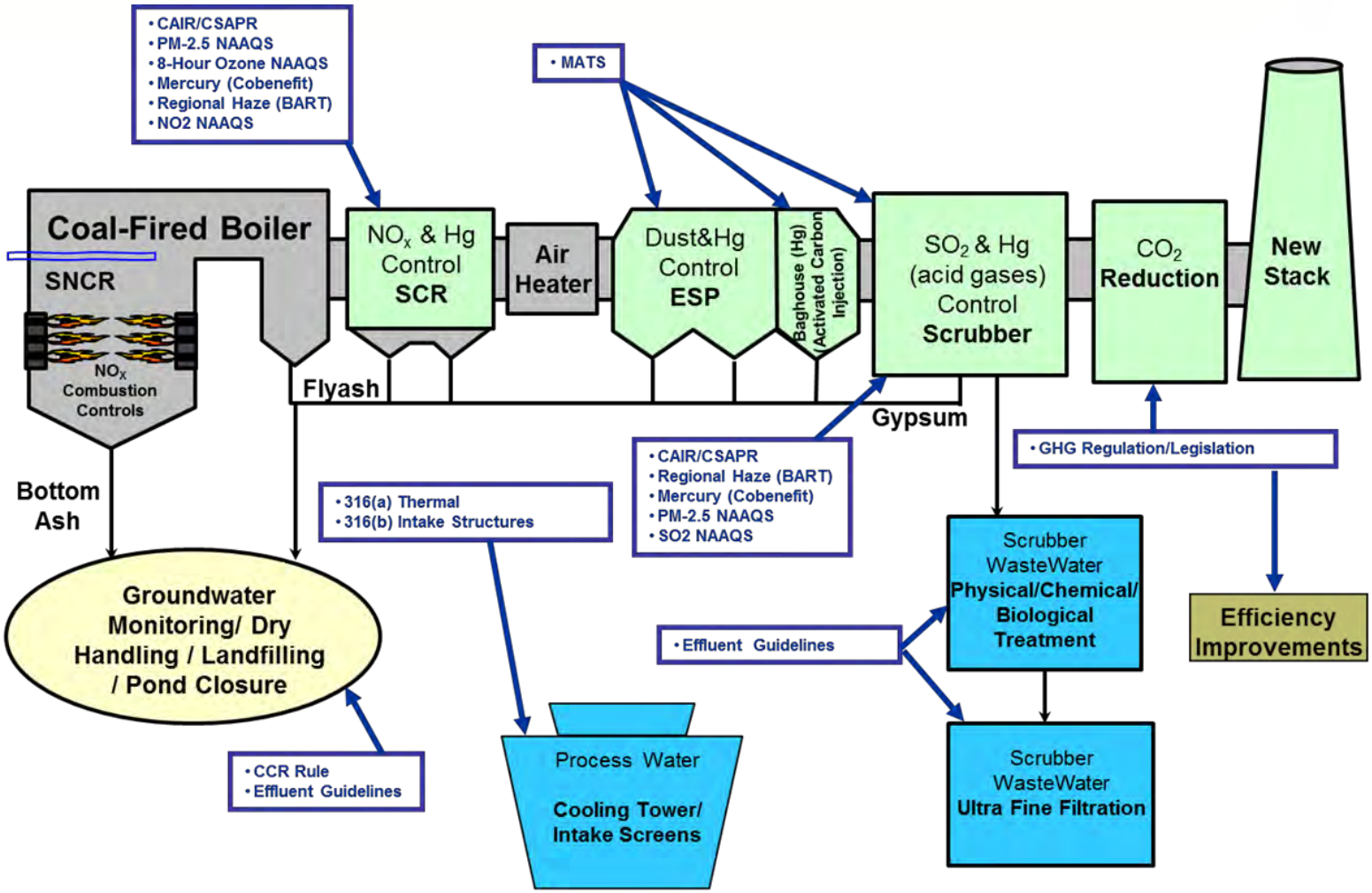
- Intake structure requirements to protect aquatic life
- Cooling Towers
- Wastewater treatment standards
- Increased permitting / mitigation



Coal Combustion Residuals (CCRs)

- Fly Ash
- Bottom Ash
- Boiler Slag
- FGD Material

Emission Controls for Coal-Fired Boilers



Major Environmental Regulatory Activities

Final Rules

Coal Combustion Residuals
- Effective October 2015
- Compliance planning underway

Waters of the U.S.
- Effective August 2015
- Broad expansion of the definition
- Widespread legal challenges

Startup, Shutdown, and Malfunction SIP Call
- States must modify existing state plan provisions by November 2016
- Legal challenges by states and others likely

Impending Final Rules

Clean Power Plan
- Final rules as early as late July 2015
- Minimal expected changes from proposal
- Legal challenges and stay motion

Effluent Limitations Guidelines
- Final rule expected September 2015

Supreme Court Decisions

MATS
- Remanded back to the DC Circuit – EPA must consider costs
- Rule remains in effect

Coal Combustion Residuals

- CCRs regulated as non-hazardous waste under Subtitle D of RCRA.
- Federal criteria is separate and independent of all existing or any future state requirements (creates "dual regulatory path").
- "Self-implemented" by each company; Owner / Operator self-directs its own compliance.
- Compliance achieved by posting of large amounts of compliance data certified by a professional engineer to company's external web page. *(i.e. structural integrity, groundwater protection, location restrictions, fugitive dust complaints, pond liner status)*.
- Non-compliance enforced through RCRA citizen suits in federal district court.

December 19, 2014 – EPA released final rule.

April 2015 – Federal Register publication.

October 2015 – Effective date.

Waters of the United States (WOTUS)

- Final rule published June 29, 2015, by EPA and U.S. Corp of Engineers.
- Greatly expands the scope of the regulatory definition of “Waters of the U.S.” for Clean Water Act Programs.
- Lakes, streams, rivers, and ditches that fall under this definition are subject to the Clean Water Act.
- Could impact operations that disturb land adjacent to any newly defined WOTUS areas, including transmission and distribution lines, generation sites, and renewable energy projects.
- Becomes effective August 28, 2015.

Startup, Shutdown and Malfunction (SSM)

- Removes emission limitation exemptions during SSM in 36 states.
- Final rule expected July 2015.
- States must revise SIP provisions by November 22, 2016.
- As proposed, the rule could potentially:
  - Result in numerous “violations” of permit limits
  - Impose significant operational constraints
  - Require additional or updated controls
  - Increase O&M cost

Greenhouse Gas Regulation

Regulatory Timelines and Process

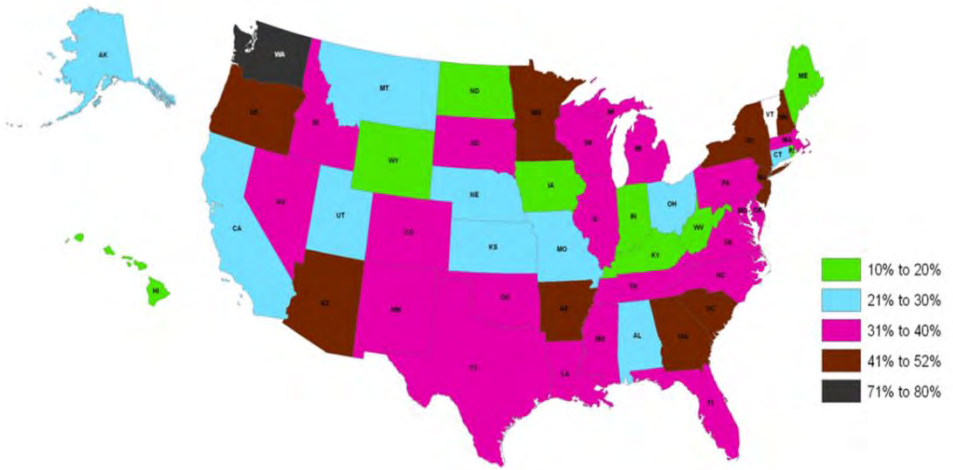
- GHG New Source Performance Standards
  - Final rule expected Summer 2015
- GHG Modified & Reconstructed Source Performance Standards
  - Final rule expected Summer 2015
- **GHG Emission Guidelines for Existing Sources (*Clean Power Plan*)**
  - **Final guidelines expected Summer 2015**
  - **Federal plan proposal expected Summer 2015 / Final Summer 2016**
    - **Provides States guidance in developing state plans**
    - **Provides States a potential backstop for state plans**
    - **EPA's attempt to build the record for future litigation**

2015 Regulatory Strategy Activities

- Congressional activity in 2015
- Continued external engagement
- Final rule analyses
- State plan development support

Clean Power Plan Proposal for Existing Sources

- Binding, state-specific CO_2 emission rate (lb/net MWh) goals in 2020 – 2029 and for 2030 and beyond.
- 2012 baseline.
- Emission Reductions based on four so called "building blocks."
  - Coal unit heat rate improvements of 6%
  - Annual NGCCs capacity factor increased to 70%
  - Increasing renewable energy and preserving "at risk" and under construction nuclear
  - Increasing demand-side energy efficiency
- States determine how to meet goals.



Effluent Limitation Guidelines (ELGs)

- ELGs are technology-based regulations to control industrial wastewater discharges; Current “Steam Electric” regulations established in 1982.
- EPA sets limits for each industry based on Best Available Technology that is Economically Achievable (BAT).
- Potential requirements include zero discharge for fly and bottom ash, stringent limits, strict recycle/reuse of wastewaters, and very sensitive analytical method requirements.
- Final rule expected in September 2015.
- Compliance no later than 2022 (Subject to change).

MATS Status

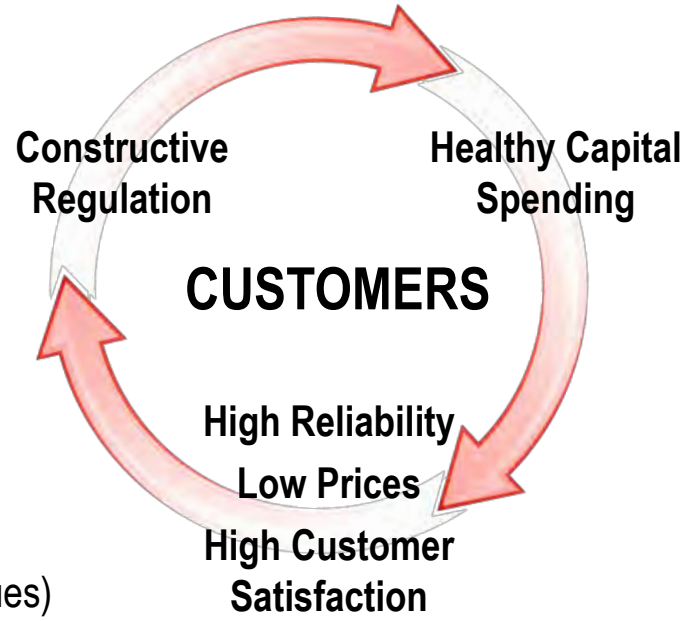
- Compliance required April 2015, or April 2016 with 1-year extension.
- On June 29, 2015, the Supreme Court remanded the rule to the D.C. Circuit.
  - Held that EPA failed to properly consider costs
  - Rule remains in effect during remand.
  - Utility cost savings?

The Utility Industry in Perspective

Challenges

- Federal Policy
  - Climate
  - CSAPR/NAAQS
  - CCR/Ash
  - Water
  - MATS
  - Permitting
  - Litigation
- Commodity Costs
  - Natural Gas
  - Coal
- Construction Issues
  - Cost Uncertainty
  - Labor Cost/Availability
  - Materials
  - NIMBY (Transmission issues)
- Technology
  - Emission Controls/CCS
  - Reserve Margins
  - Renewable Advancements
  - Distributed Generation/Microgrid
  - Transportation Electrification
  - Disruptive Technologies
- Other Issues

Circle of Life



Future

Control/Retrofit Coal Units?

Retire Coal Units?

Add Transmission?

Install Gas?

Invest in Energy Efficiency?

Build Nuclear?

Invest in Renewables?

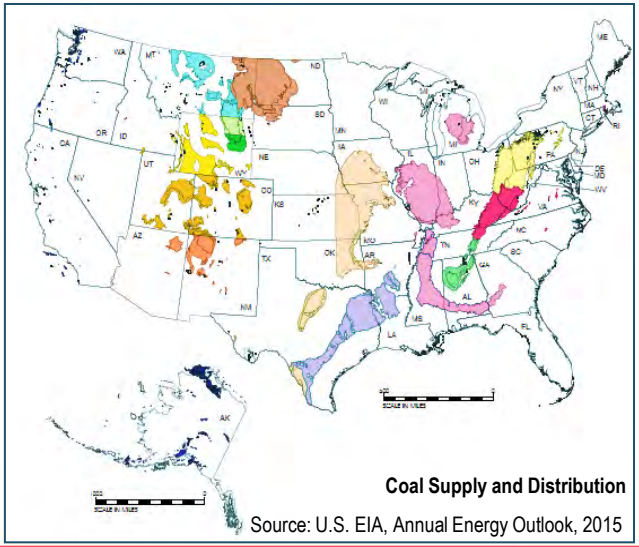
Alternative business models?

Future of Utility Industry Depends on Many Factors

- Regulatory environment.
- Climate Action Plan.
- Coal in the U.S. energy mix – essential to national economy.
- Energy security, economic stability and energy diversity.
- Substantial transportation electrification.
- Grid transmission and gas pipeline infrastructure.
- Distributed generation and microgrids.
- Renewables.

Coal as An Energy Option

- Abundant supply and affordable.
- Proven reliable.
- Tremendous investment in existing fleet.
- Highly efficient with current/new technologies.
- Historical environmental challenges have been overcome.
- Current challenges are ash and water.
- The ultimate challenge – CO_2.
- Since 2003, global coal energy consumption has increased 9 times faster than for wind and 40 times faster than for solar energy.
- Abundant electricity supplies enhances health.



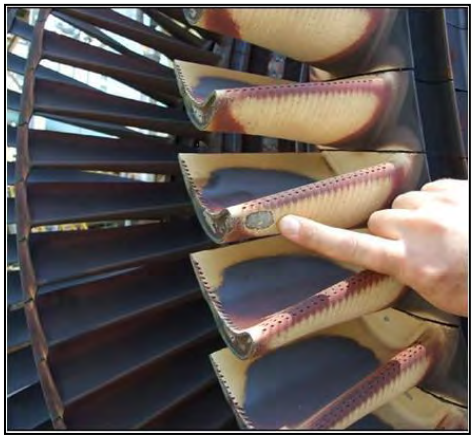
Coal Supply and Distribution

Source: U.S. EIA, Annual Energy Outlook, 2015

Power Generation Research

Drivers

- Reliability
- Heat rate
- Regulations



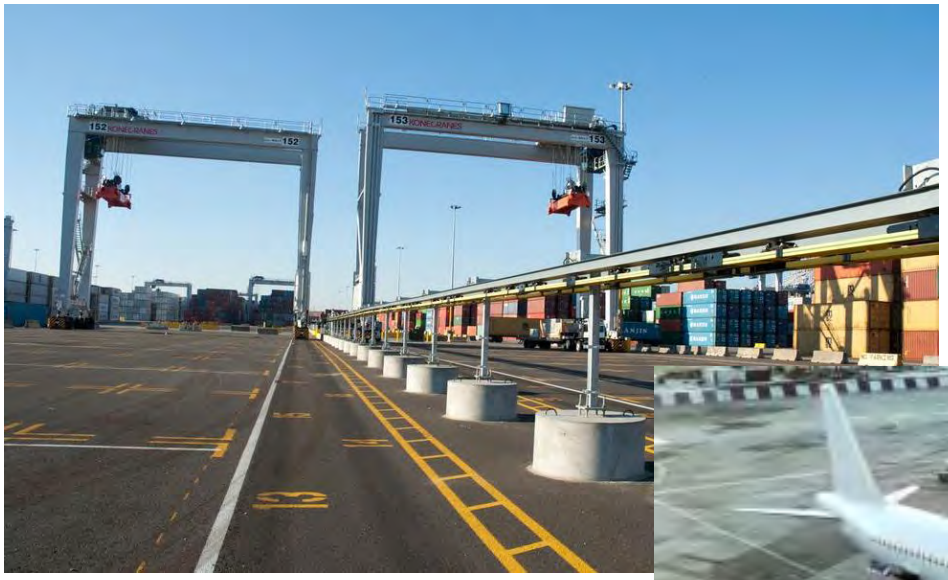
Thrusts

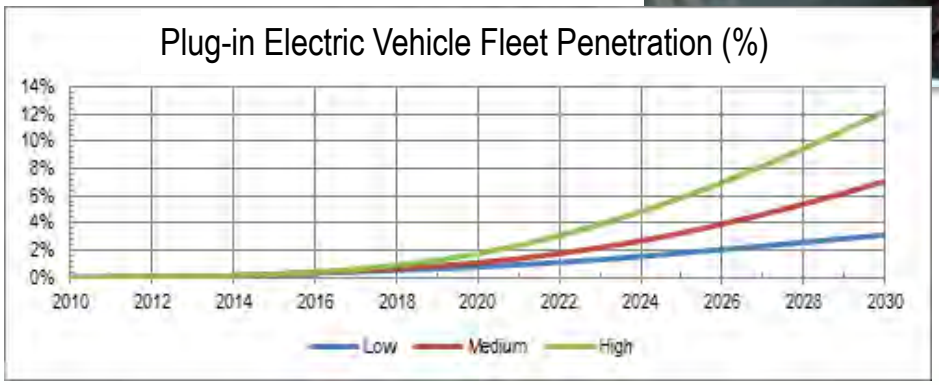
- Component life
- Fleet monitoring
- Performance and I&C
- Advanced fossil systems

Boiler Materials

- Advanced UltraSuperCritical

Transportation Electrification





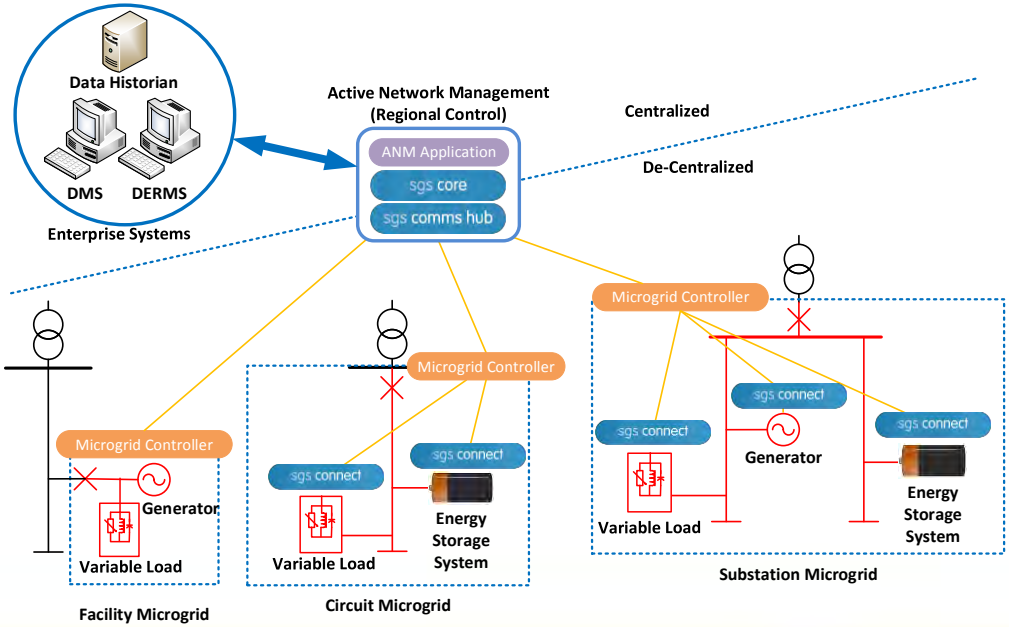
DG and Microgrids Portfolio

- Natural gas distributed generation – the other DG
  - Reciprocating engines
  - Microturbines
  - Fuel cells
  - Combined heat & power (CHP)
- Microgrids and their control

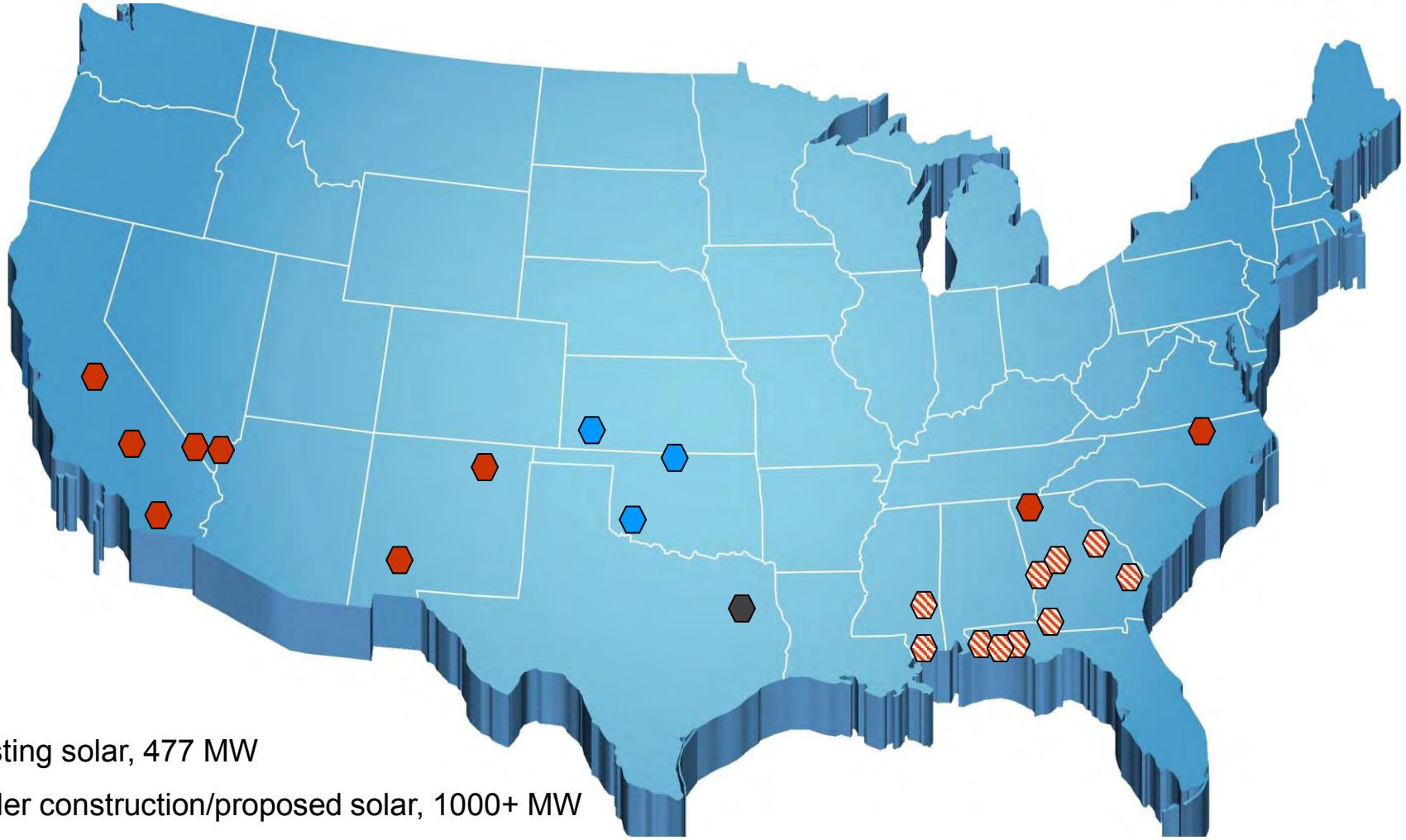
Recip Engines with CHP

Microturbines

Fuel Cell



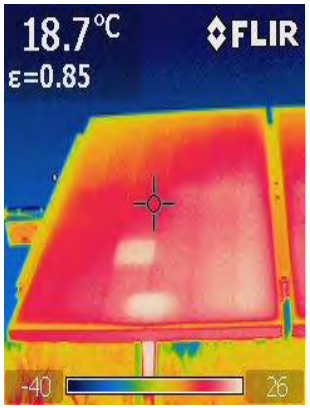
Renewable Energy Projects



- Existing solar, 477 MW
- Under construction/proposed solar, 1000+ MW
- Long-term wind contracts, 953 MW
- Biomass plant, 116 MW

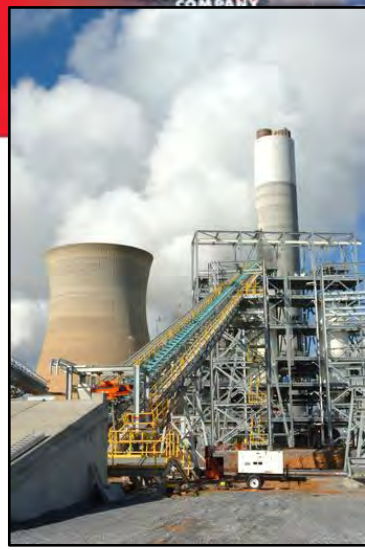
Southeastern Solar Research Center

- Test bed for advanced technologies
- Performance Model validation
- O&M technology testing
- Accelerated aging research



http://www.youtube.com/embed/rJOR7FG7N1A?autoplay=1

Research Update



- National Carbon Capture Center
- Water Research Center
- Southeastern Solar Research Center
- Unmanned Aerial Vehicles for Transmission Asset Inspection
- Energy Storage Systems RD&D Facility
- Power Generation Research
- Heat Pump Research

Carbon Capture and Storage Projects

National Carbon Capture Center

- U.S. DOE facility operated by Southern Company.
- Accelerates commercialization of technologies.
- Coal or natural gas constituents tests.
- Enables coal-based power plants to achieve near-zero emissions.

25-MW CCS Demo at Plant Barry

- 90% CO_2 capture.
- Capture, compression, transport, sequestration.
- ~115,000 tons sequestered, ~240,000 tons captured.
- Largest CCS facility on a fossil-fueled power plant in the U.S.

Water Research Center
at Plant Bowen

Develop and test water efficiency technologies in an actual plant setting

The Future of the Electric Utility Industry