

## “Coal’s Path to Energy Dominance”

### SSEB’s Committee on Clean Coal Energy Policies and Technologies

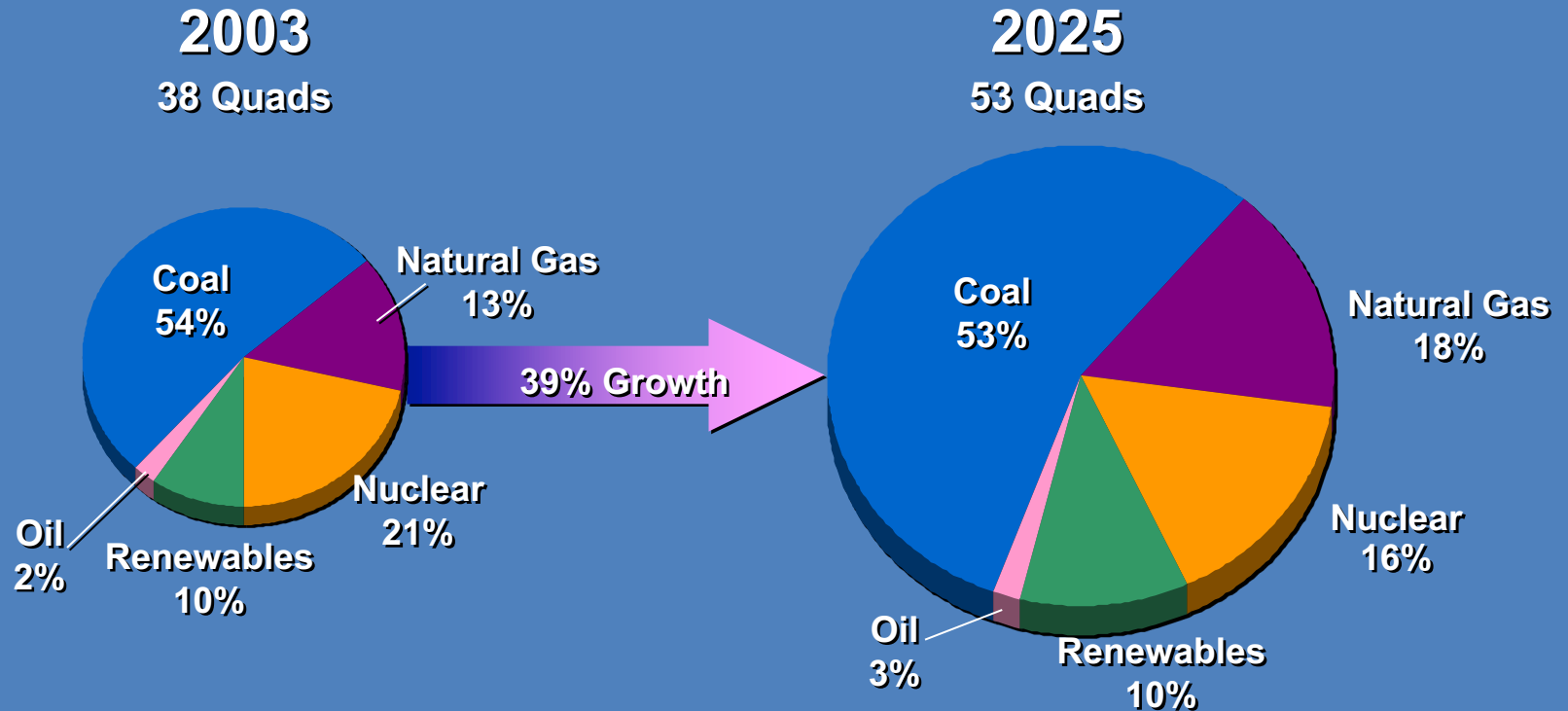
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Director of Coal Business Operations

Office of Fossil Energy

May 21, 2018

# U.S. Electricity Consumption

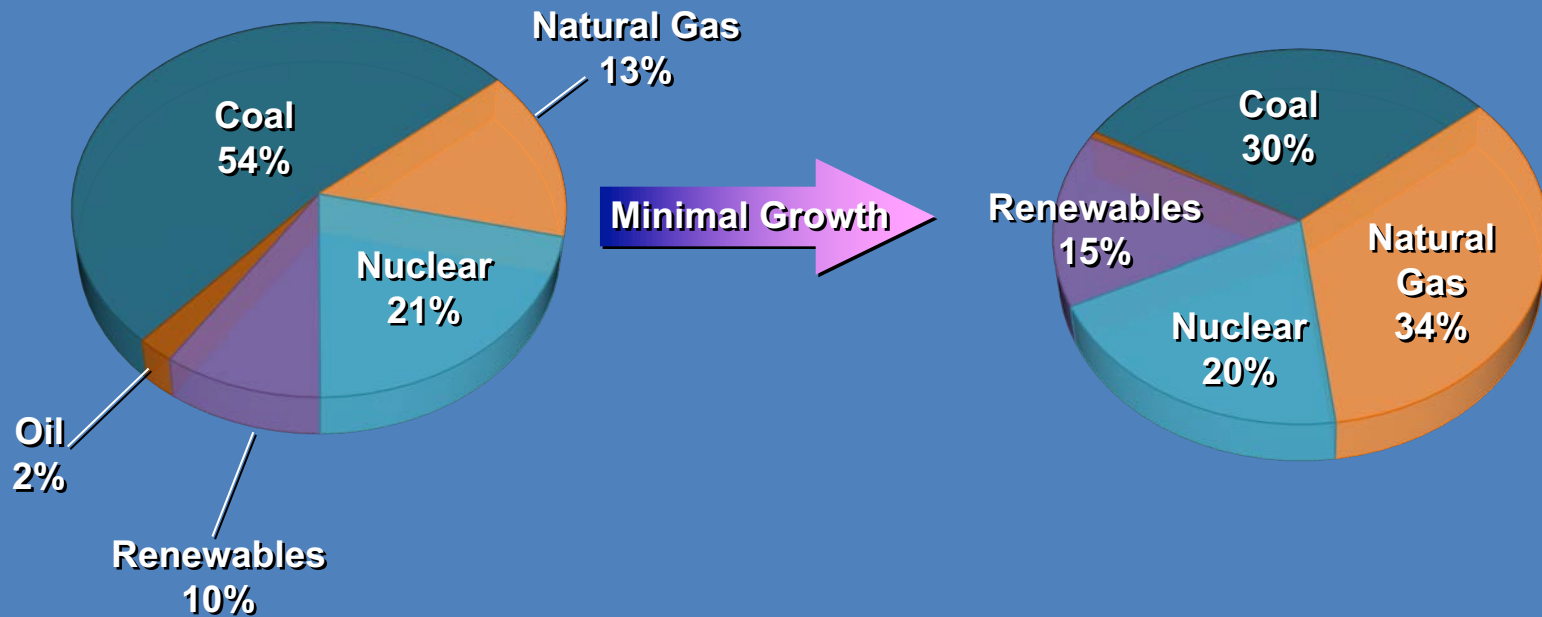


By 2025, over 356 GW of new generating capacity are expected in the U.S. alone to meet growing demand and to replace retiring units

# U.S. Electricity Generation

2003

2016



Source: EIA <https://www.eia.gov/tools/faqs/faq.php?id=427&t=2>

Note: Electricity consumption in the United States was ~3.85 trillion kilowatthours (kWh) in 2016

Source: AEO2005, Table A2

# BENEFITS OF COAL

## ENERGY SECURITY

Coal provides a baseload power source essential to supporting our grid and providing electricity to millions of Americans.

## ECONOMIC DEVELOPMENT AND JOBS

Coal mining, transportation, and usage produces thousands of jobs throughout the United States, particularly in high coal producing states.

## ENERGY ABUNDANCE

The U.S. has more coal (~477 billion short tons) than any other country, and eclipses remaining U.S. oil and natural gas resources.

## COAL IS A KEY PART OF A DIVERSIFIED ENERGY PORTFOLIO

Over 30% of electricity is coal-generated. Coal is the second most used energy source to generate electricity after natural gas.

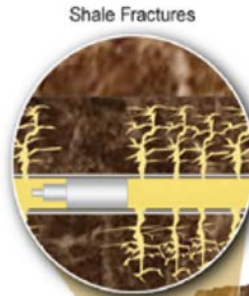


# DOE Office of Fossil Energy

## Office of Clean Coal and Carbon Management



## Office of Oil and Natural Gas



(Not to scale)

## National Energy Technology Laboratory



## Strategic Petroleum Reserves



# Types of Work We Do

## RESEARCH AND DEVELOPMENT

Our office advances transformative science and innovative technologies that enable the reliable, efficient, affordable, and environmentally sound use of fossil fuels.

## SYSTEMS ANALYSIS

We primarily focus on:

- Environmental Issues
- Economic Analysis and Validation
- Data and Tools to Support Advanced Coal and CCUS
- Policy, Regulatory, and Financing

## INTERNATIONAL ENGAGEMENTS

Our office works with international partners to leverage global research efforts and promote US leadership in fossil fuel technologies.

## EDUCATION AND OUTREACH

We work to educate a variety of stakeholders on the benefits and challenges of clean coal usage through funding initiatives, creating informational materials, participation in workshops, community outreach, and other special events.



# What We Work On



## ADVANCED ENERGY SYSTEMS

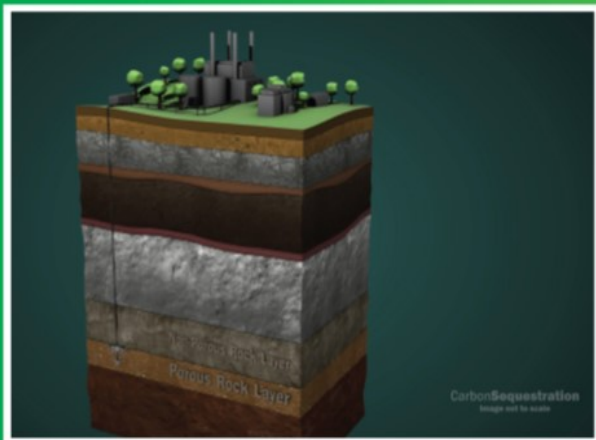
This program is focused on improving the efficiency of coal-based power systems, enabling affordable CO<sub>2</sub> capture, increasing plant availability, and maintaining the highest environmental standards.

## CROSSCUTTING RESEARCH

This program serves as a bridge between basic and applied research by fostering the development and deployment of innovative systems for improving efficiency and environmental performance through the research and development of instrumentation, sensors, and controls targeted at enhancing the availability of advanced power systems while reducing costs.

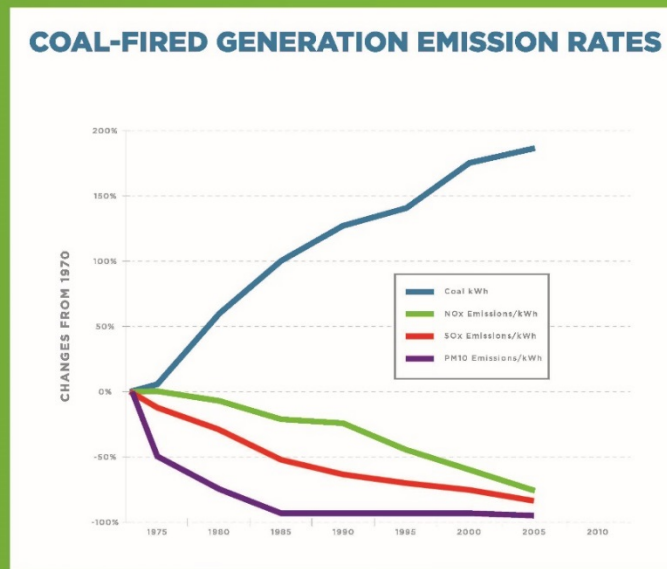
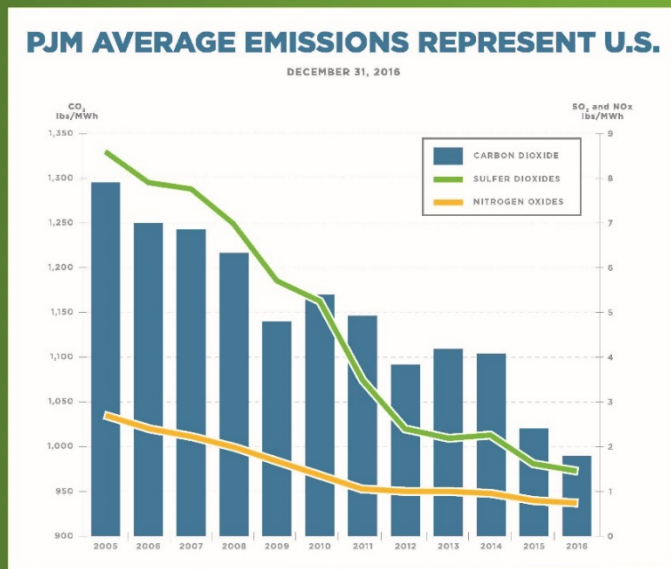
## CARBON CAPTURE, UTILIZATION AND STORAGE R&D:

This program advances safe, cost effective, capture and permanent geologic storage and/or use of CO<sub>2</sub>.



# Is it Working??

- The Clean Coal Technology (CCT) Program was one of the most successful public/private partnerships ever implemented.
- Significant Emissions reductions (SO<sub>2</sub>, NO<sub>x</sub>, PM) were achieved between 1970 and 2008 -- while coal generation doubled.
- Emissions are still decreasing through 2016 (helped in part by low cost natural gas).
- In 2008, Southern Company estimated the direct value from lower SO<sub>2</sub> and NO<sub>x</sub> compliance costs due to these DOE programs at more than \$20 billion.



# My Notes from ASFE Winberg's Talk



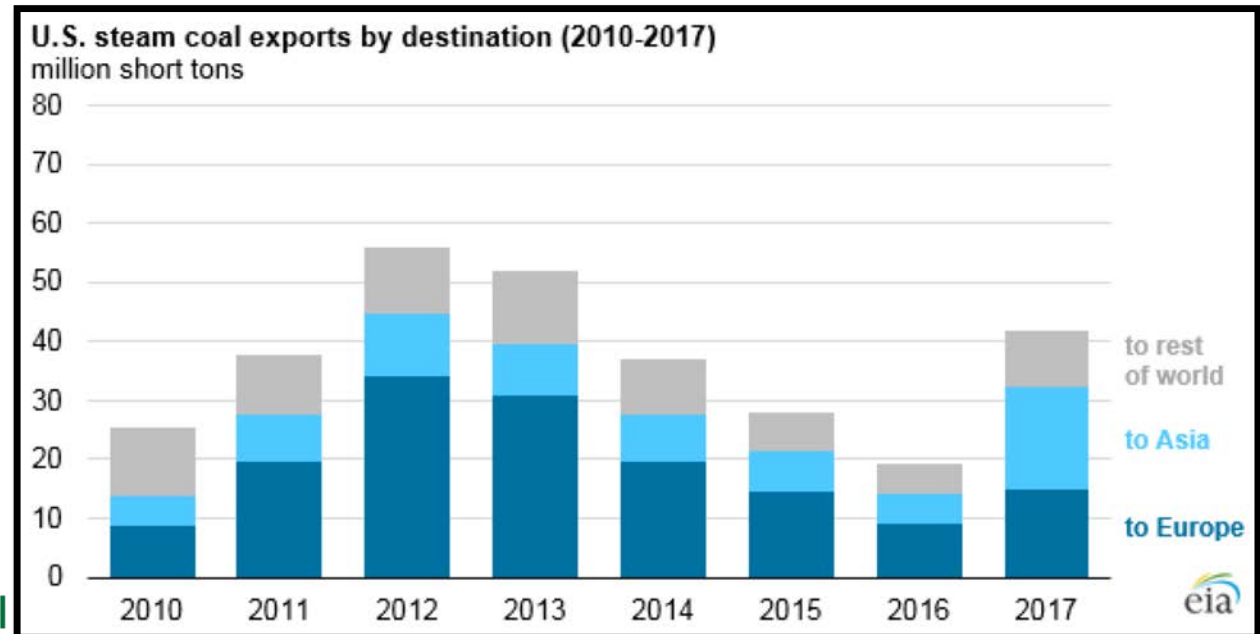
- We should be optimistic about Coal
- This President/Administration understands the value and necessity of coal resources.
- Coal is a HUGE part of the President's "America First Energy Plan"
- We have to tackle the environmental regulations and overall regulatory uncertainty that ultimately hamper investments in coal plants, for both new units and improvement retrofits. The previous administration's Clean Power Plan and New Source Review are perfect examples.
- We are working to "Level the Playing Field" for Coal
  - removing artificial, ideologically motivated barriers to the use of an abundant energy resource that remains critical to our grid and our energy security — barriers that actually threaten the grid's stability and energy security, and have wreaked havoc on jobs and communities across America. And barriers that reflect a false choice between growing our economy and caring for the environment. We can do BOTH!!!"



# My Notes from ASFE Winberg's Talk



- We have already seen a revival in US coal exports. Last month EIA reported that 2017 saw the largest year-over-year tonnage increase in coal production since 2001, driven in part by an increase in demand for U.S. coal in Asia and Europe. Overall, we saw a 61 percent increase in coal exports from 2016 – and coal exports to Asia more than doubled last year.



U.S. DEPARTMENT OF  
**ENERGY**

Fossil  
Energy

Source: <https://www.eia.gov/todayinenergy/detail.php?id=35852>

# My Notes from ASFE Winberg's Talk



- **We are at the beginning of the next cycle of coal technology advancements.**
- **Our budget request for FY 19 is designed to take advantage of that opportunity**
- **The overall Administration request for the Office of Fossil Energy is \$697 million. Over half of that amount – or \$343 million – is targeted for our coal R&D, and it includes an additional \$200 million for clean coal R&D made available in the Bipartisan Budget Act. This is a significant bump in funding, and it speaks volumes about the President's support for what we're trying to do in our coal research — and his strong support for coal.**
- **In the budget you'll see new nomenclature: “Advanced Coal Energy Systems and CCUS Program.” This program reflects our priority on R&D to improve the efficiency and reliability of the existing fleet of coal-fired power plants, while developing advanced technologies and processes that will be used in the next generation of coal power plants.**



# Advanced Coal Energy (ACE) Systems

- Our nation's coal generation fleet must be able to provide flexibility, economic security, and be counted on to help address future energy challenges
- To that end, this Administration proposes the launch of the **Advanced Coal Energy (ACE) Systems Pilot Initiative** to competitively fund infrastructure efforts that repower and modernize our current coal fleet
- Advanced technologies for integration are ready for large pilot scale, a key development stage prior to commercial demonstration
- The ACE Initiative will support the development and construction of three large-scale pilot facilities (50+MWe) that will operate by the 2022 / 2024 timeframe
- Support and engagement from a coalition of industry technology providers, coal suppliers and power generators will be essential to ensure successful commercial uptake and broad deployment
- RFI was released on 5/8/18 under the name of "Coal-Based Power Plants of the Future." We would welcome your input



# Benefits

- Offers significant benefits over conventional coal power systems:
  - dramatic improvements in efficiency,
  - integration of emissions control for both criteria pollutants and CO<sub>2</sub> in their design, and
  - addressing water consumption and solid waste generation issues
- Will improve environmental benefits as well as potentially create large volumes of CO<sub>2</sub> available for Enhanced Oil Recovery (EOR)
- Will produce near-term jobs for the construction of these facilities; and support longer-term permanent jobs in coal mining, advanced technology, and power generation.
- Create an export opportunity for these technologies, especially to underdeveloped countries.

# For Additional Information



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