Edison Electric
INSTITUTE

The Future of Coal

Southern States Energy Board
Clean Coal Committee
May 23, 2017
Kingsport, TN

The Electric Power Industry: Vital to America's Economy

$990 billion
INDUSTRY

1 MILLION+
DIRECT & INDIRECT JOBS

$120.8 billion
TOTAL CAPEX
PROJECTED FOR 2016

1/3 OF
U.S. POWER GENERATION
COMES FROM ZERO-EMISSIONS
SOURCES (NUCLEAR AND RENEWABLES)

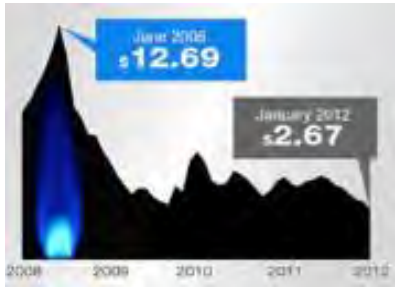
POWER PLANT CO_2 EMISSIONS
ARE NEARLY
21% BELOW
2005 LEVELS
(AS OF 2015)

USE OF
ELECTRICITY
INCREASED
36%
(1990-2015)

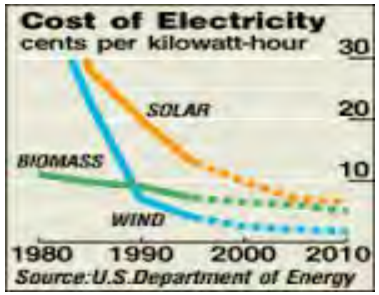
Transformation Drivers

New technologies, models and uses

Low natural gas prices

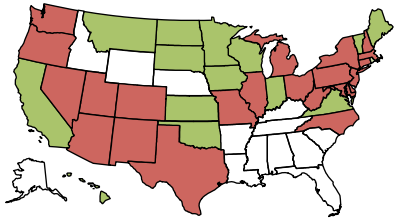


Declining technology costs



Diversification

Public policies



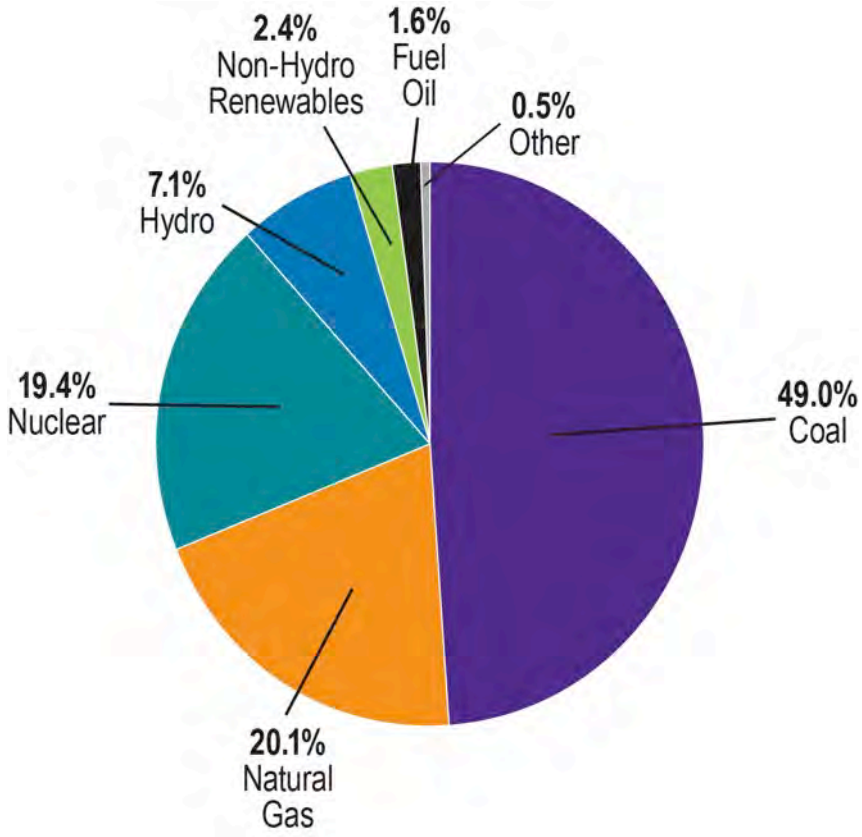
Financial incentives

Customer demand

Environmental regulations

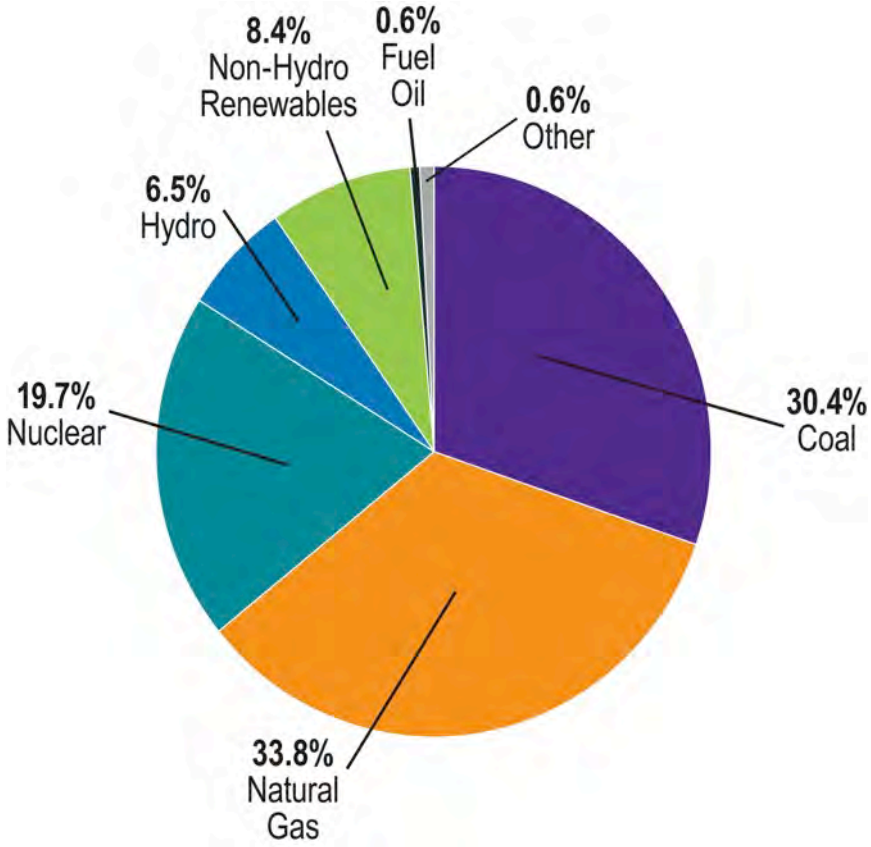
Our National Fuel Mix Is Changing

2006 National Energy Resource Mix



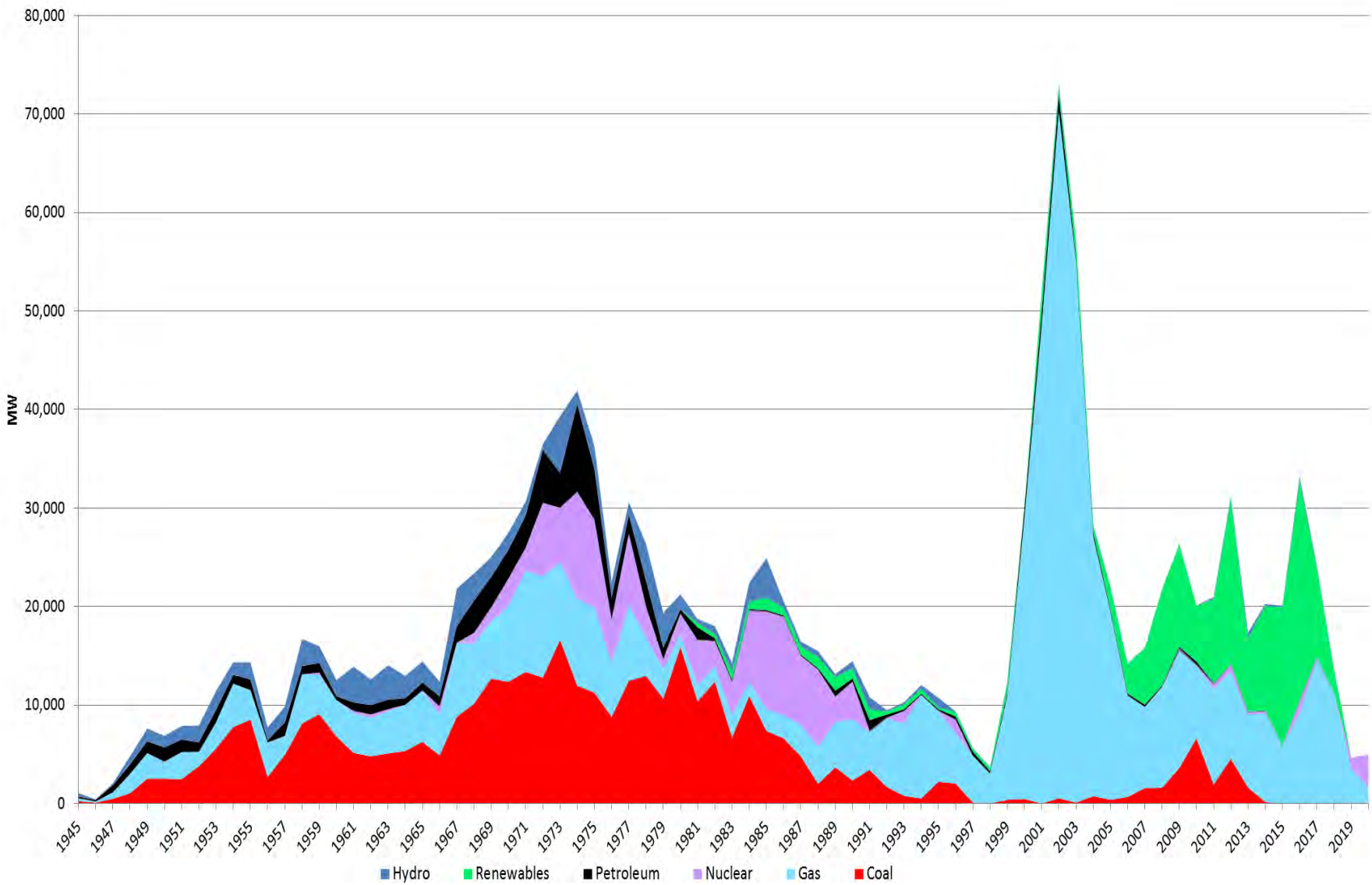
2016 National Energy Resource Mix

(Preliminary)



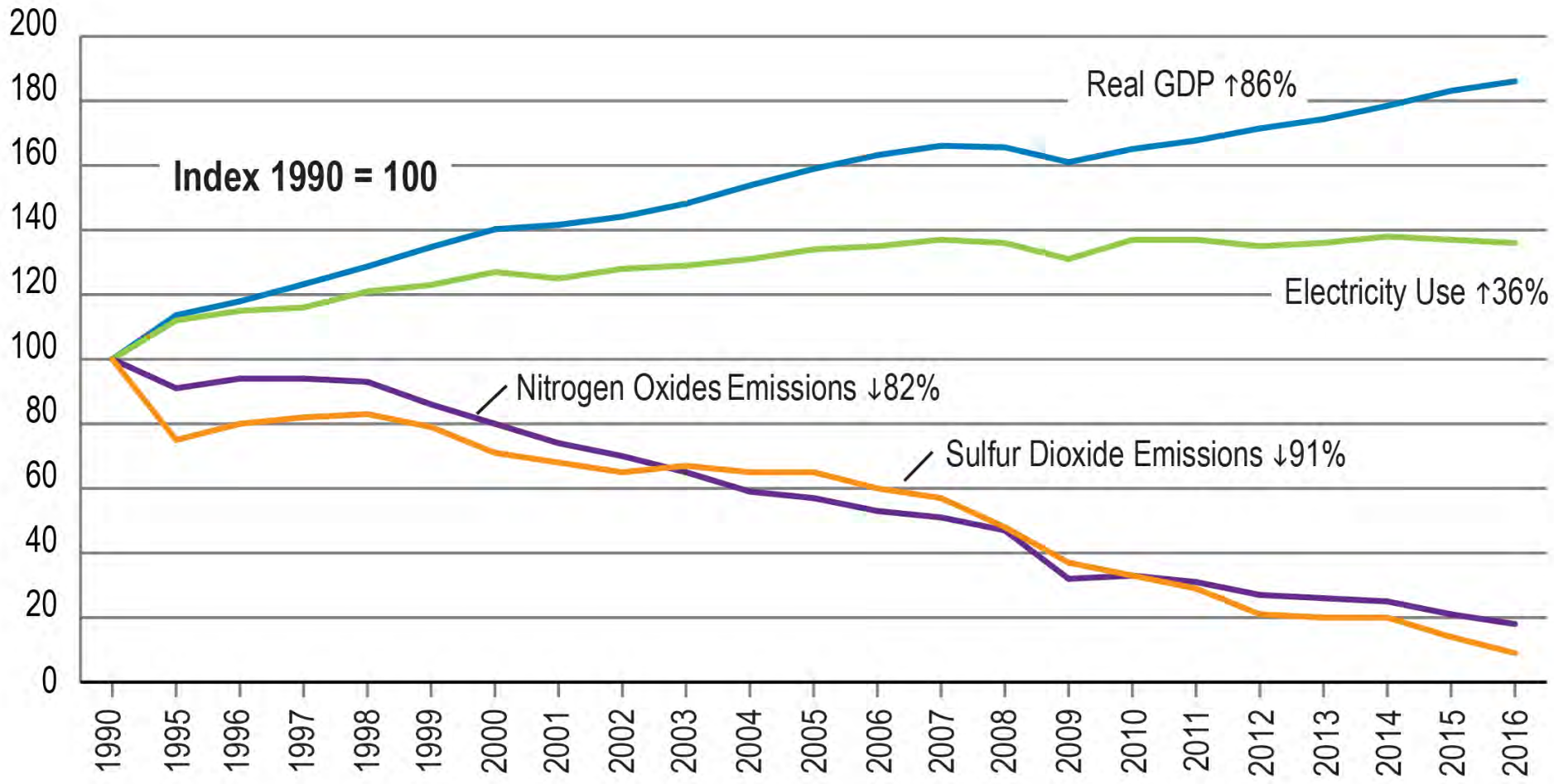
Source: Department of Energy, Energy Information Administration

Capacity Additions
Historical and Under Construction



Data from Velocity Suite, ABB Enterprise Software

Power Plant Emissions Drop Significantly Since 1990

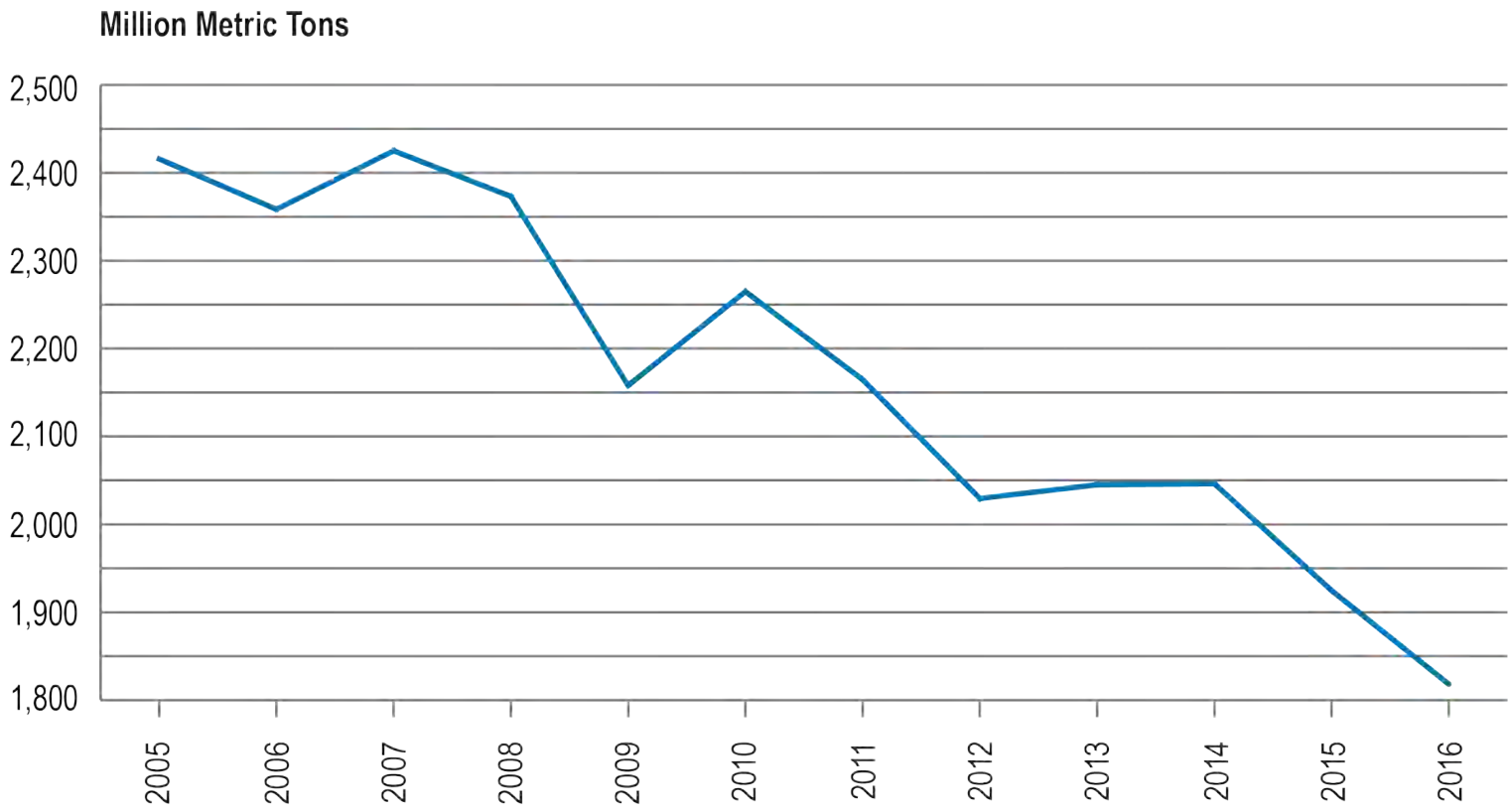


1990 represents the base year. Graph depicts increases or decreases from the base year.

Sources: U.S. Department of Energy, Energy Information Administration (EIA), U.S. Environmental Protection Agency (EPA), and U.S. Bureau of Economic Analysis.

U.S. Power Sector
Carbon Dioxide Emissions Declining (2005-2016)

- 1/3 of U.S. power generation comes from zero-emissions sources
- As of 2016, industry CO_2 emissions were nearly 25 percent below 2005 levels
- Trajectory will continue based on current trends



Source: Developed from U.S. Energy Information Administration, *Monthly Energy Review*, March 2017.

Industry Priorities

- Comprehensive Tax Reform
- Infrastructure Investments
- Grid Security
- Preserving Balanced Energy Mix

Environmental Challenges: 2017 and Beyond

Air

- Multiple NAAQS
- Interstate Transport
- Regional Haze/Visibility
- Mercury & Air Toxics
- Modeling, Permitting & Monitoring

Climate

- Evolving Policy Landscape
- State & Regional Initiatives
- International Negotiations
- Prospects for 111(d) & (b) Programs
- Technology Development & Deployment

Water

- Waters of the United States
- Effluent Guidelines Limitations
- 316(b)
- Total Maximum Daily Loads
- Waterbody-Specific Standards

Land & Natural Resources

- Infrastructure Siting and Permitting
- Endangered Species
- Avian Protection
- Vegetation Management

Waste & Chemical Management

- Coal Ash
- PCBs in Electrical Equipment
- TSCA
- HazMat Transport

Carbon Policy Landscape

- Executive branch
  - President: Executive Orders, FY2018 budget, etc.
  - Political appointees (EPA Administrator, etc.)
  - Next steps on GHG regulations
- Congress continues to be divided
  - No clear majority to pass legislation; Extensive oversight likely
- States moving forward at various speeds
  - Stakeholder dialogs continuing, even if informally
  - Some pursuing new carbon policies, state plans *regardless* of CPP prospects
- International
  - Paris Agreement entered into force last year; sets long-term framework
  - Will U.S. withdraw from Paris or UNFCCC process?

Administration Actions

- Energy Independence EO
- Lifting of federal coal leasing moratorium
- Overturning stream protection rule
- Numerous promises to put coal miners back to work

Administration Challenges

- Transition
- Slow confirmation process
- Tension between political appointees and career staff
- Higher level of controversy than usual

…Many stakeholders promoting many ideas…

States: Key Players

- Major role – energy and environment
- Pres. Trump's nominees come from state governments and support increased federalism
- Reduced Federal rulemaking likely lead to new state activities
  - Limitations allowing or restricting more stringent programs than at Federal level
- Federal grant availability

Coal Industry Impacts

- DTE Energy Co announced it will build more natural gas and renewable power plants and shut all of its coal units by 2040, reducing carbon emissions by more than 80 percent from 2005 levels by 2050.
- "*What's driving this change has nothing to do with Trump and....state regulators. It has everything to do with customers and technology.*" (Tom Fanning, CEO, Southern Company)
- "*I'm not going to build new coal plants in today's environment*" (Ben Fowke, CEO, Xcel Energy)
- "*Utility planning typically takes place over much longer periods than presidential terms of office*" (BHE)
- "*There may not be immediate plans for utilities to bring on more coal, but the future is always uncertain in this market*" (National Mining Association)

Retirement of a Coal Unit

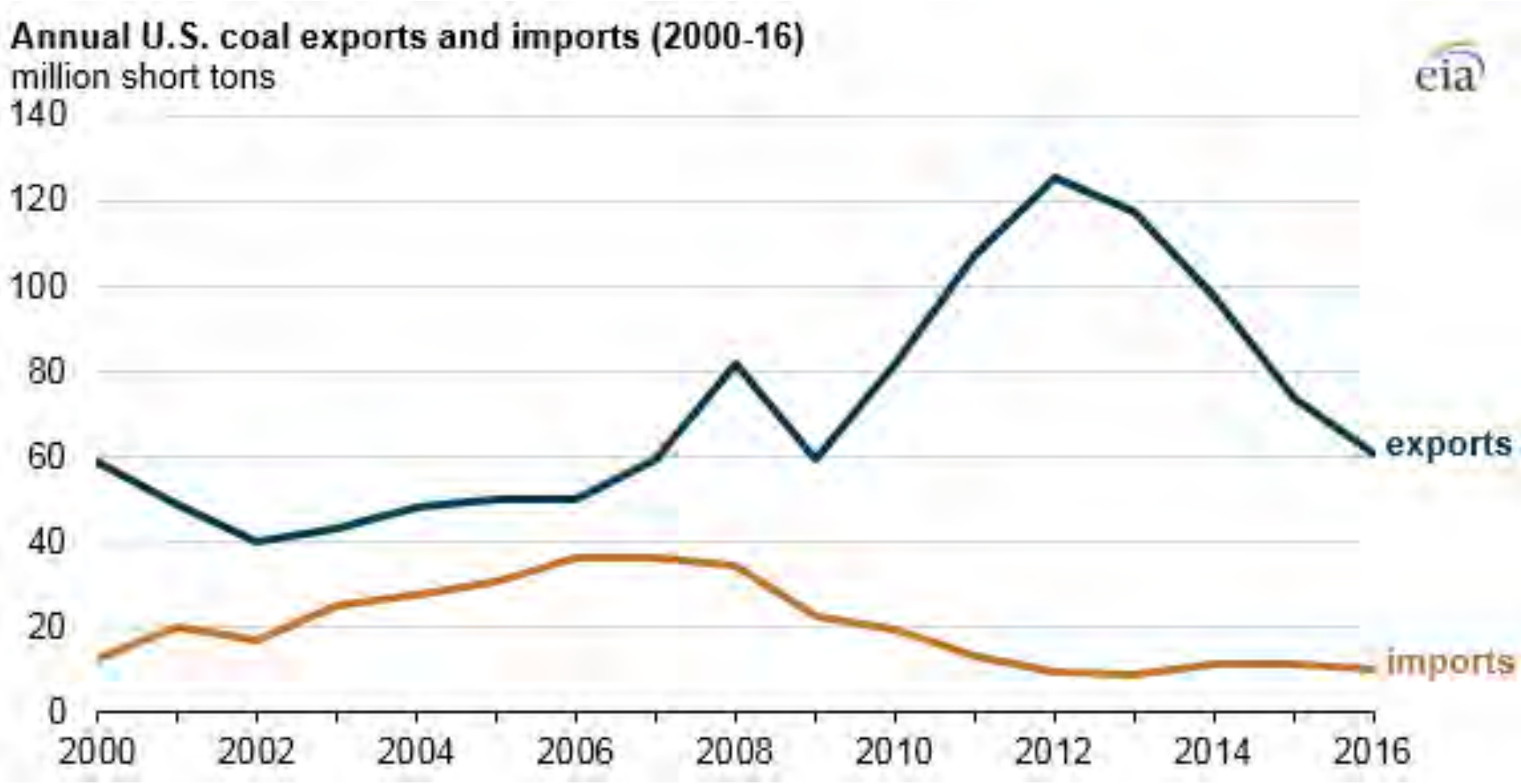
- The decision to retire a coal unit is made after a thorough evaluation of operational and economic parameters
- Once the decision has been made to retire a power plant, there are many subsequent decisions that must be made involving, among others:
  - ultimate end use of the power plant site
  - decommissioning schedule
  - selection of the contractor
  - strategies for environmental remediation, permitting and transmission mitigation
  - workforce transition

Potential new federal focus?

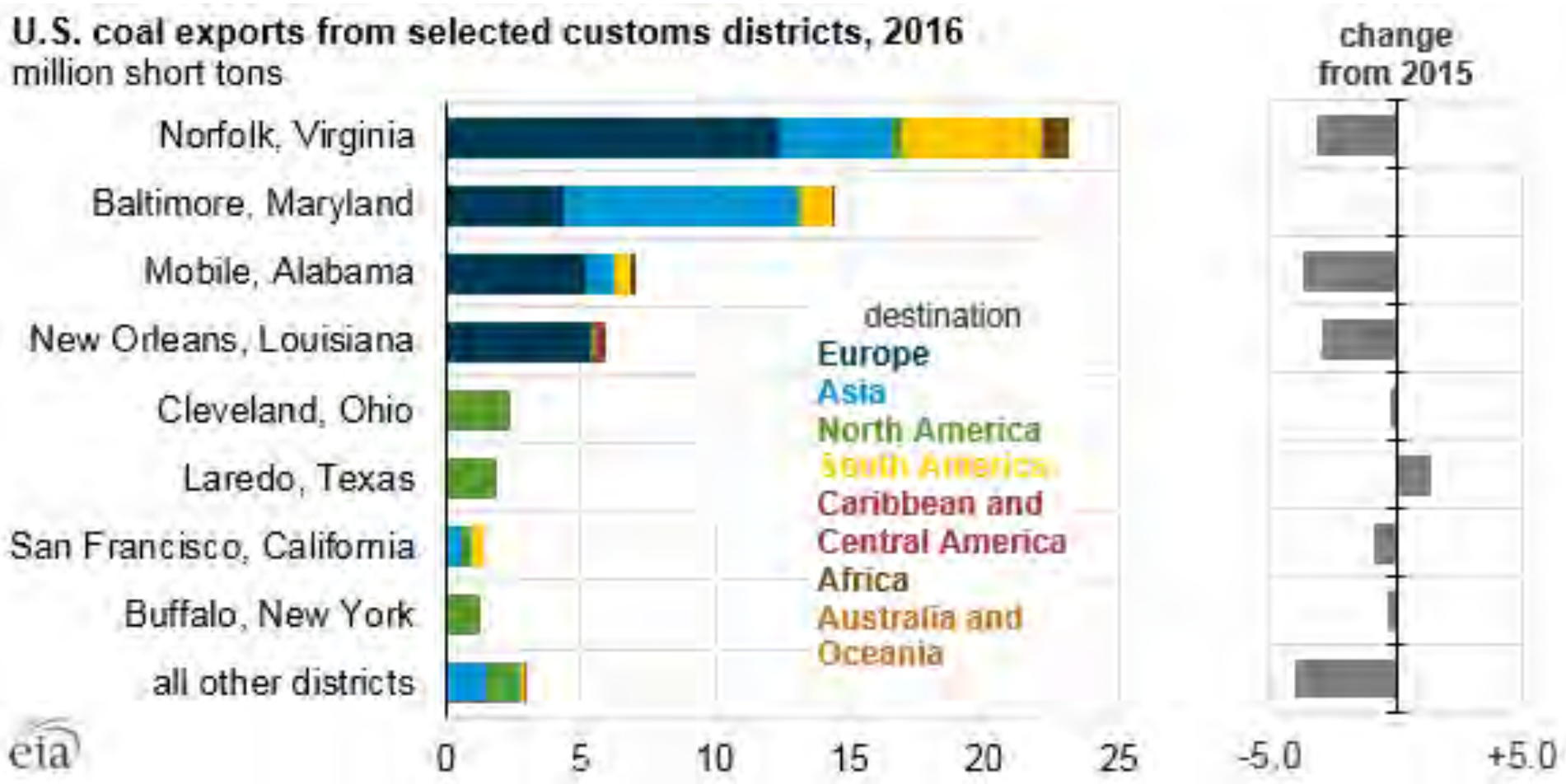
Preserving/Enhancing Existing Coal and Natural Gas Fleet

- Supercritical and ultra supercritical generation technology (SC/USC)
- Heat rate/efficiency improvements
- Carbon capture and storage
- Use of coal as feedstock for other commodities

Future Prospects - Exports

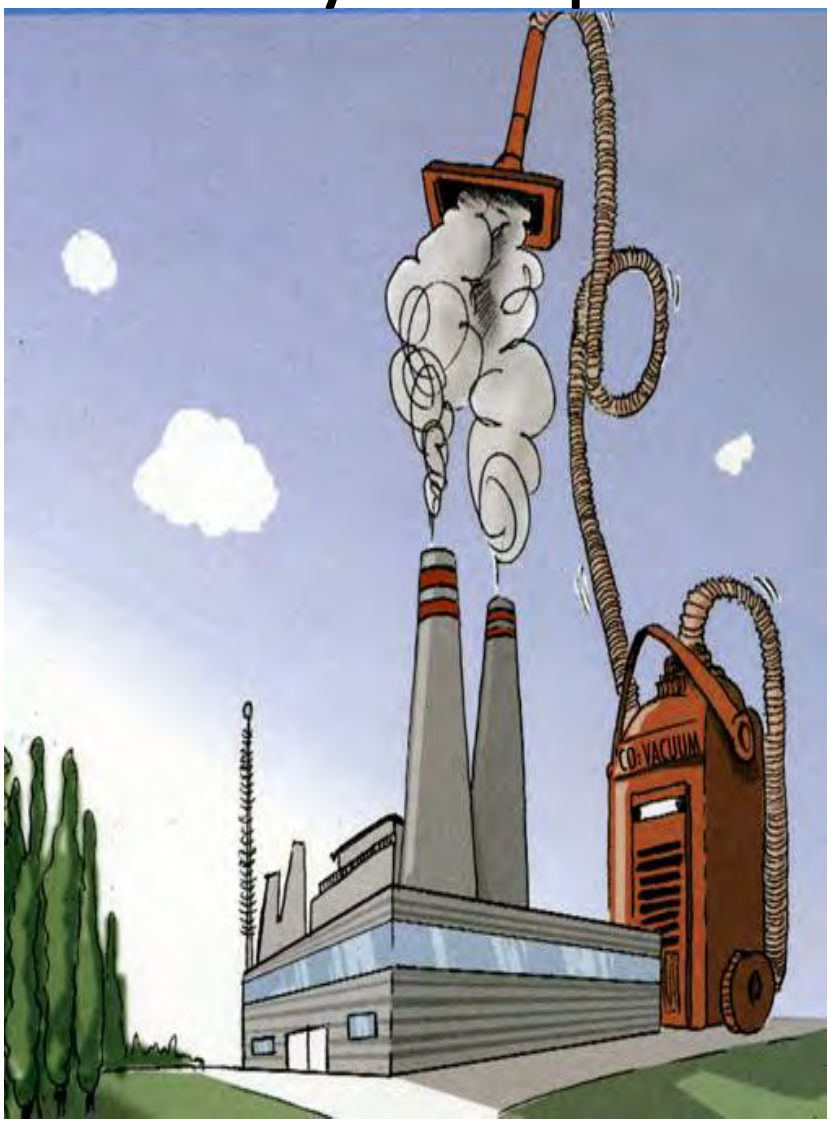


Future Prospects – Exports (2)



Future Prospects - CCS

Not really this simple!



Pacific Northwest National Laboratory, U.S. DOE

- Still has not been successfully demonstrated and operated at the scale needed for a commercial power plant.

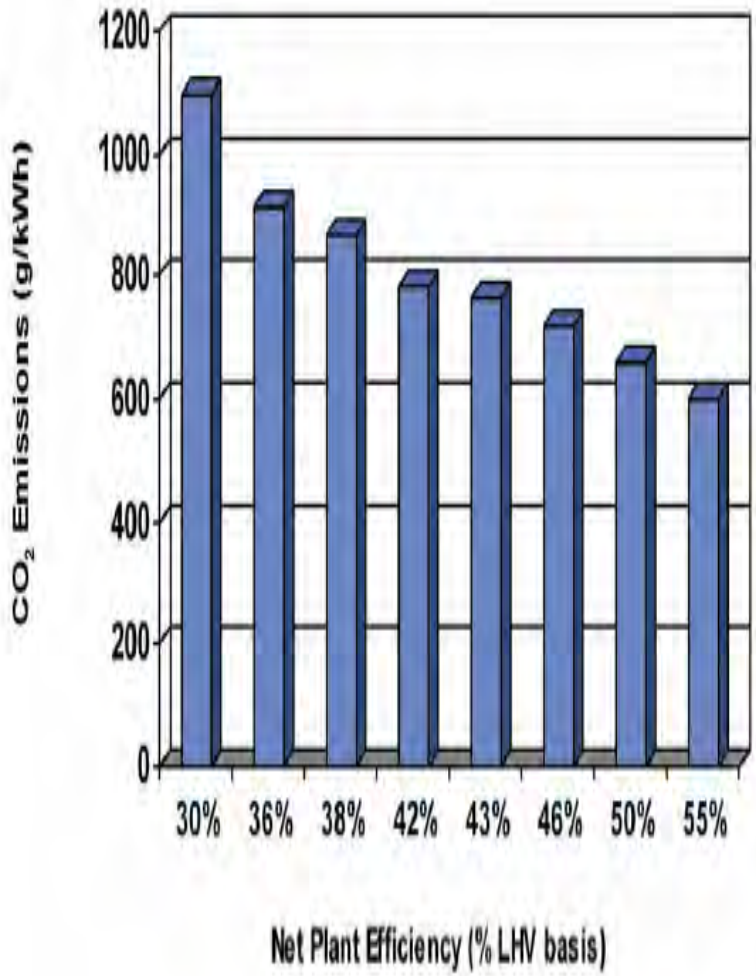
- Many regulatory and legal challenges remain. Not insurmountable but still exist. Examples, liability for geologically-injected CO2 over hundreds of years; conflicts between EPA's Class II and Class VI permits; classification by EPA that CO2 is a solid waste – opens the door to various RCRA/ CERCLA issues.

Future Prospects – Delay of Some Plant Closures

Carrier-effect!

- May 17, 2017 - Navajo Nation President announced that a temporary lease-extension agreement to keep the Navajo Generating Station operating until 2020 is being considered by the Salt River Project utility
- Could something similar happen at Colstrip, MT?
- Role of early retirement of nuclear plants?

Future Prospects – New Plants



Advantages of SC and USC Technologies

- Reduced fuel costs due to improved plant efficiency
- Significant improvement of environment by reduction in CO_2 emissions
- Plant costs less than other clean coal technologies
- Much reduced NOx, SOx and particulate emissions

Over 600 supercritical coal-fired units have been successful commercial operation for decades worldwide and approximately 60 ultra-supercritical units in operation worldwide

Any Questions?

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