REINHOLD ENVIRONMENTAL Ltd.

2014 NOx-Combustion Round Table & Expo Presentations

February 10 & 11, 2014, in Charlotte, NC / Hosted by Duke Energy

2014 NOx-Combustion/PCUG Round Table

Power Industry Dynamics Related to the Natural Gas Influence and its Impact on Coal Generation

DUKE ENERGY®

CAUTION REGARDING PRESENTATION INFORMATION AND FORWARD-LOOKING STATEMENTS

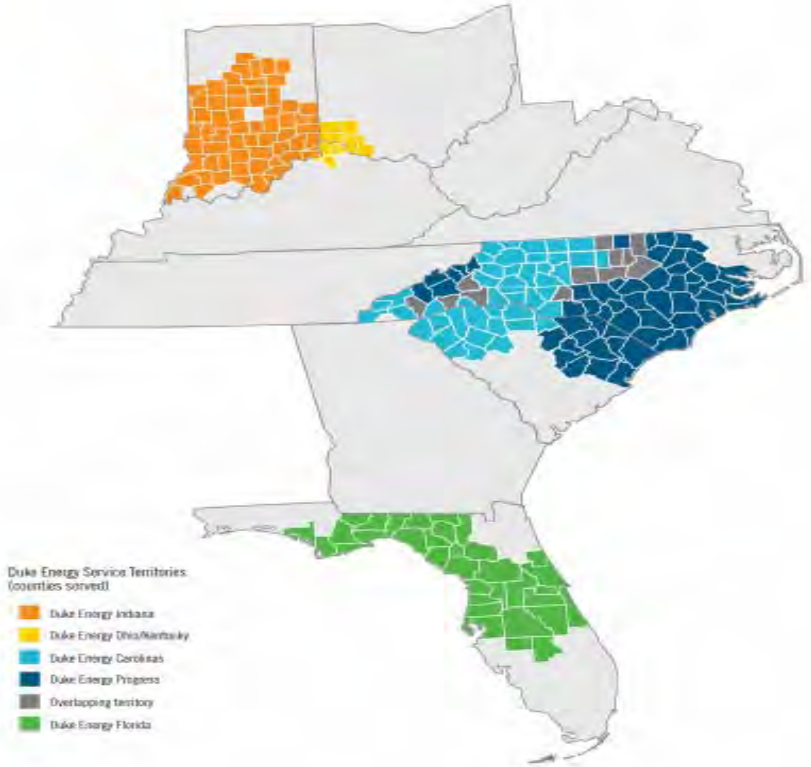
Duke Energy, its subsidiaries and affiliates, and employees (Duke Energy) make no representation as to the accuracy or completeness of the information contained herein or otherwise provided and accepts no responsibility or liability, in contract, in tort, or otherwise, should the information be found to be inaccurate or incomplete in any respect. In addition, to the extent this presentation includes forward-looking statements, illustrations and projections, Duke Energy does not and can not guarantee any future results will be occur as illustrated or presented. Duke Energy assumes no obligation to publicly update or revise any forward-looking statements, information or illustrations made in this presentation, whether as a result of new information, future events, or otherwise. Also, Duke Energy is not acting as an advisor to the recipient of this information and explicitly informs the recipient that information contained should not be relied on for any decisions or any other purpose.

Overview

- Overview of Duke Energy Fleet modernization
- Shale gas impacts on the natural gas market
- Impacts to coal demand projections
- Environmental impact of natural gas and fleet modernization

Duke Energy Today

- More than $110 billion in total assets
- Regulated utility operations
  - 49,700 MW 354 units
- Commercial Power
  - 6,800 MW
  - >1,700 MW of wind and solar
- Duke Energy International
  - 4,600 MW
  - Nearly two-thirds is hydroelectric



Modernizing our Fleet

- Retire
  - Planning to retire nearly 6,800 MW of older coal and large oil-fired capacity.
  - Number of coal fired units may shrink from 88 units (2011) to 42 units (2018).
- Build
  - Invested $9 billion in building some of cleanest natural gas and coal stations possible today, increasing flexibility and reducing emissions.
  - Invested $2.5 billion in commercial wind and solar since 2007.
  - Pursuing new nuclear options for additional carbon-free capacity.
- Upgrade
  - Invested more than $7.5 billion in air emissions control technologies since 1999.
  - Expect to spend $5-$6 billion in next 10 years to comply with new regulations.

New Facilities

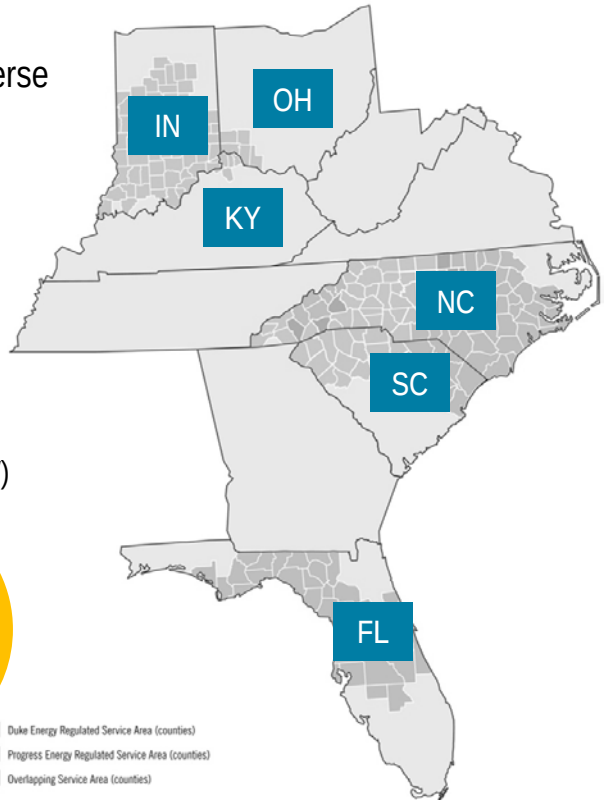
- Natural Gas
  - 3,400 MW of new highly efficient gas plants
  - Smith, Buck, Dan River, H.F. Lee, Sutton
- Coal
  - 1,400 MW using latest technology
  - Cliffside Unit 6, Edwardsport
- Renewables
  - 1,700 MW in commercial wind and solar since 2007

- New plants allow retirement of older, less efficient units
- Provides significant boost to local tax base and economy during and after construction

2013 Regulated Generation and Capacity by Region

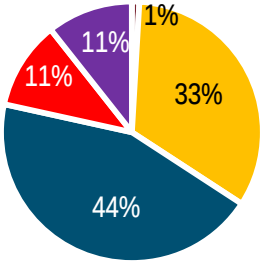
Portfolio Scale

- 6 regulated and geographically diverse jurisdictions
- 7.2 million electric customers
- 50 GW owned, available capacity
- 32,000 miles of transmission
- 250,000 miles of distribution

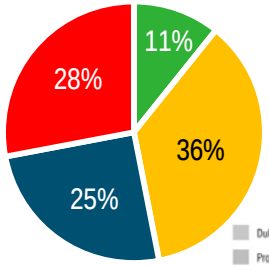


Carolinas

Generation (GWh)

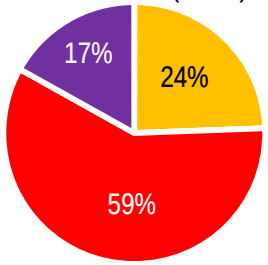


Capacity (Owned MW)

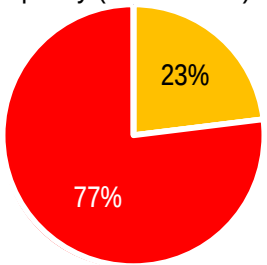


Florida

Generation (GWh)

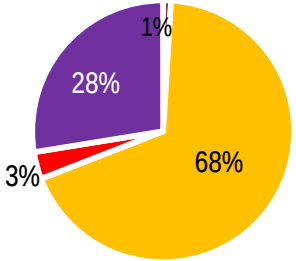


Capacity (Owned MW)

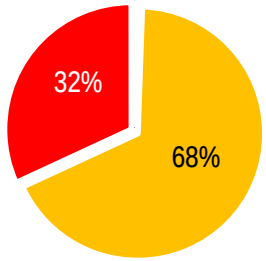


Midwest

Generation (GWh)



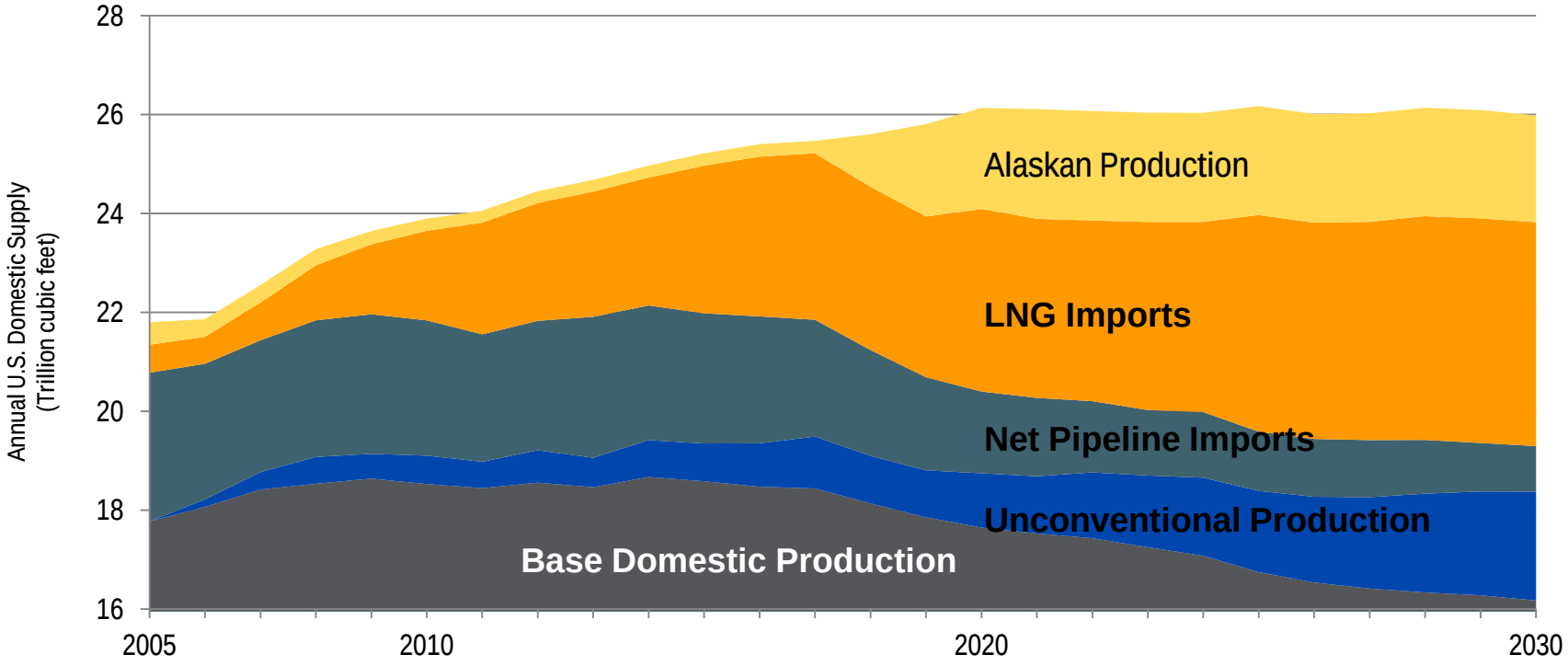
Capacity (Owned MW)



Coal Purchases Gas/Oil Nuclear Hydro/Other

2006 – Future of U.S. Natural Gas Supply Shifting Overseas

Fears of a Formation of a Natural Gas OPEC



Game Changer

- Definition of “game changer”
  - *Completely changing the way something is done, thought about, or made*

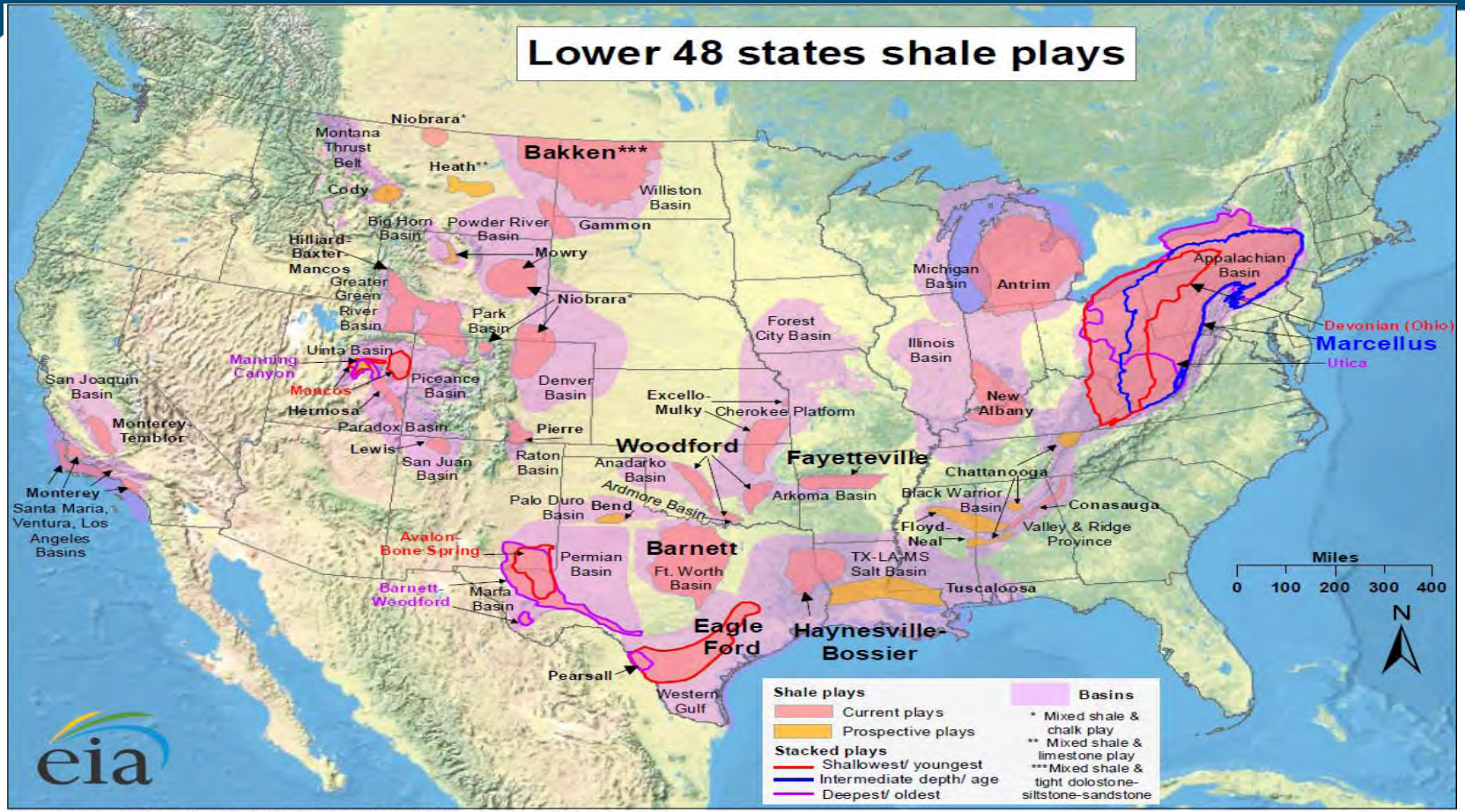
- On Friday January 3rd 2013, spot natural gas prices were ~$4.50/mmBTU. What was the Tuesday January 7th 2013 spot price for natural gas?

  a) $4 / mmBTU

  b) $14 / mmBTU

  c) $75 / mmBTU

Shale Gas a “Game Changer” - May 2011



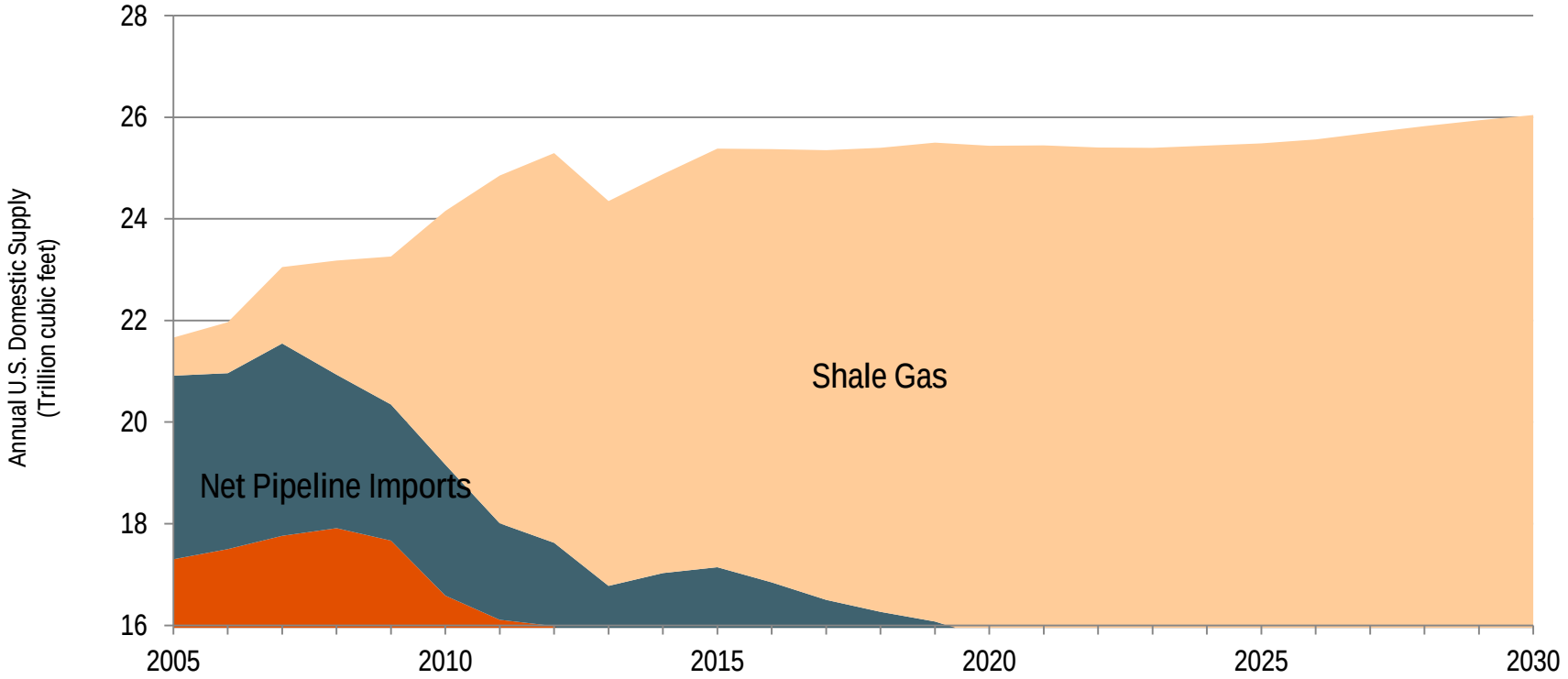
Source: Energy Information Administration based on data from various published studies.
Updated: May 9, 2011

United States at Night – December 2012

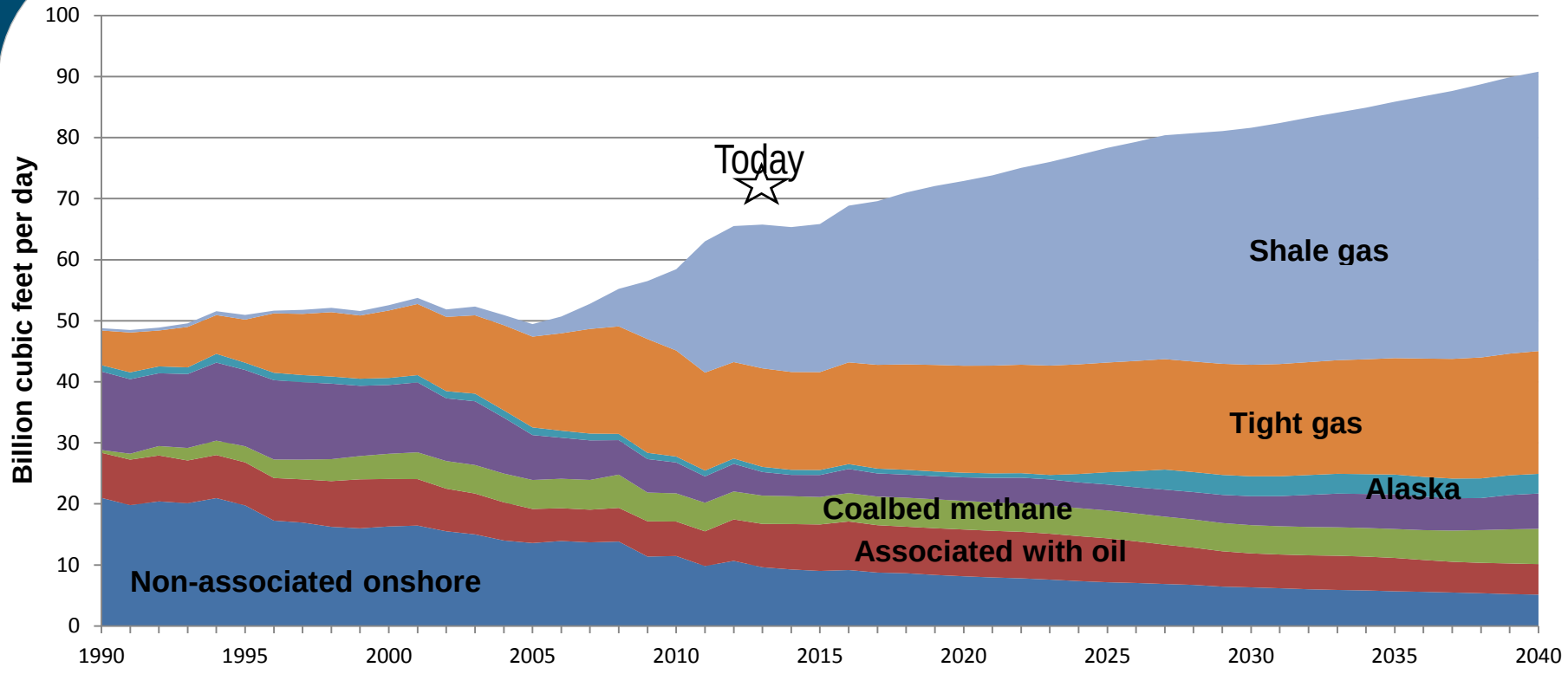
Bakken Shale Basin at Night – Dec 2012

Eagle Ford Shale Basin at Night – Dec 2012

U.S. Natural Gas Production
Shale Gas Becomes the Future of U.S. Natural Gas Supply

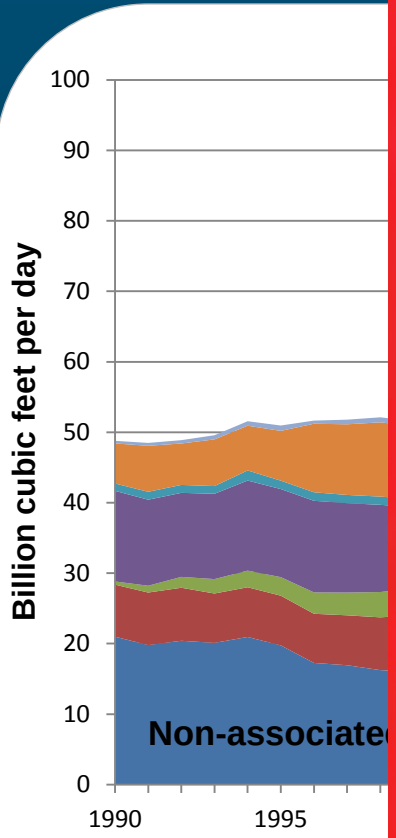


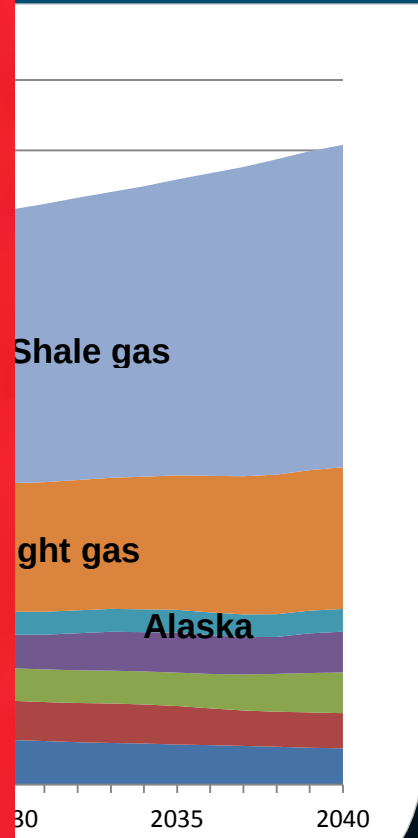
U.S. Natural Gas Production
Shale Gas Becomes the Future of U.S. Natural Gas Supply



Source: EIA, Annual Energy Outlook 2013 and America's Natural Gas Alliance

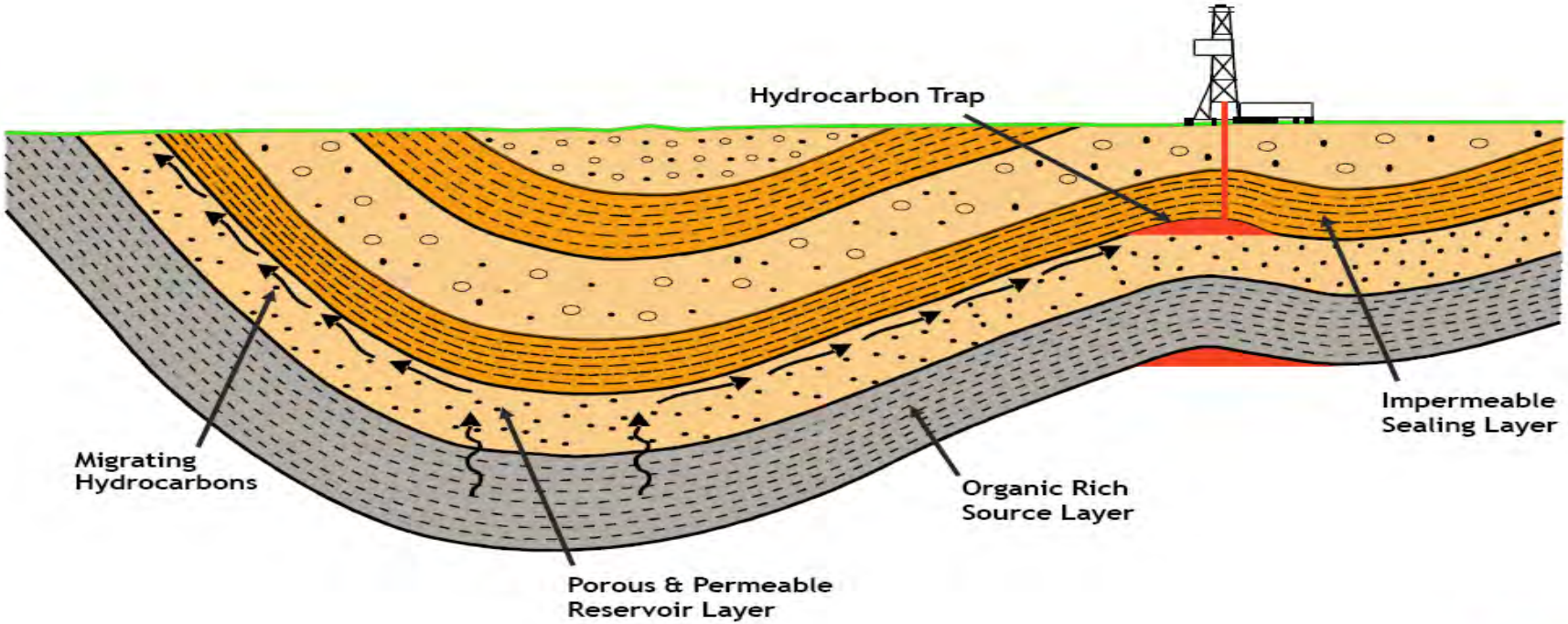
U.S. Natural Gas
Shale Gas Beco





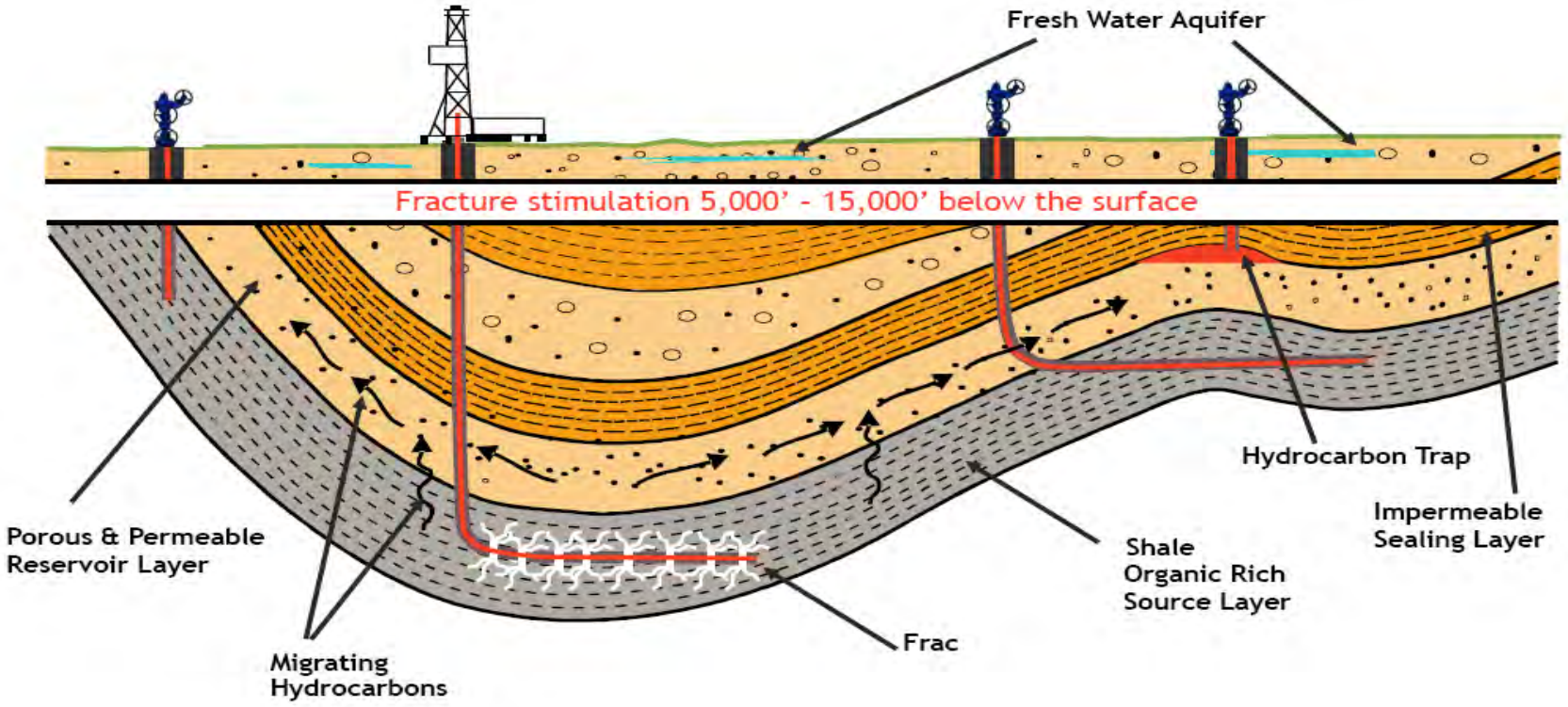
Source: EIA, Annual Energy Outlo

Traditional Vertical Drilling for Natural Gas



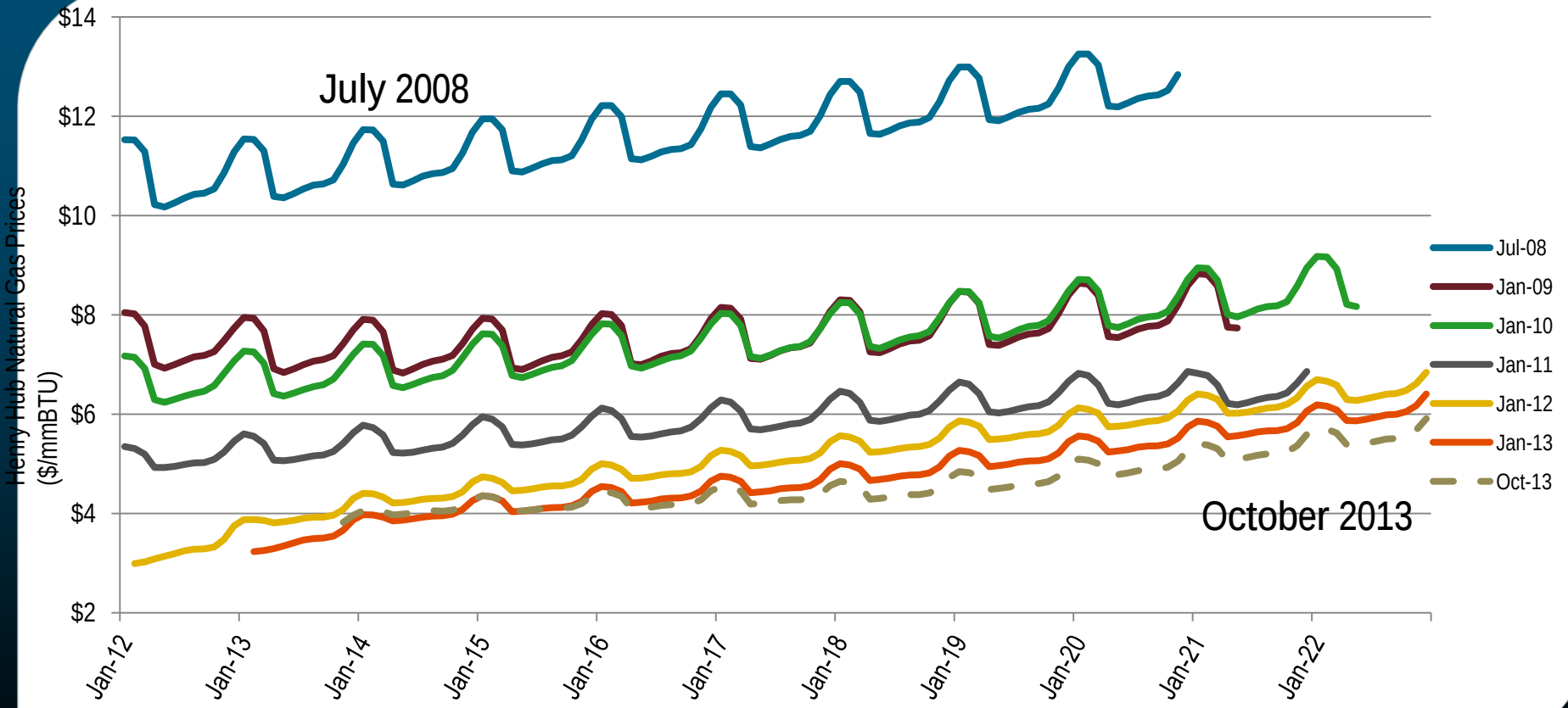
Source: Devon

Horizontal Drilling and Fracking Technology

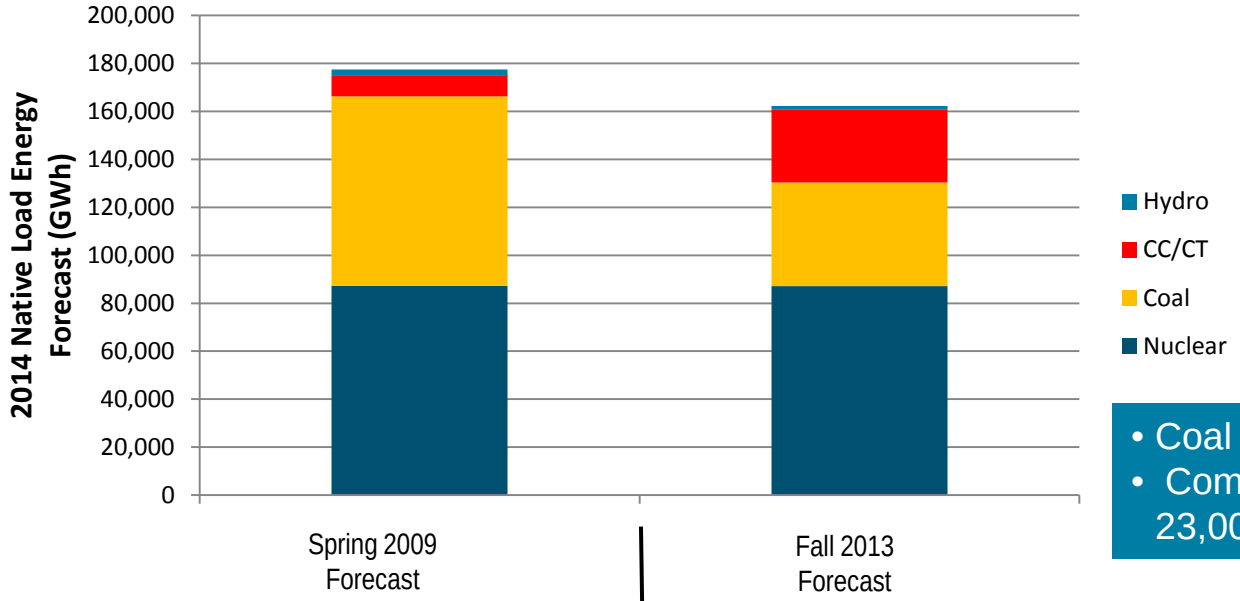


Source: Devon

Change in Long-Term Natural Gas Prices
Natural Gas Future Prices Over Time



Combined Carolina's Fleet Modernization Transition
2014 Generation Forecast Comparison: Spring 2009 vs. Fall 2013

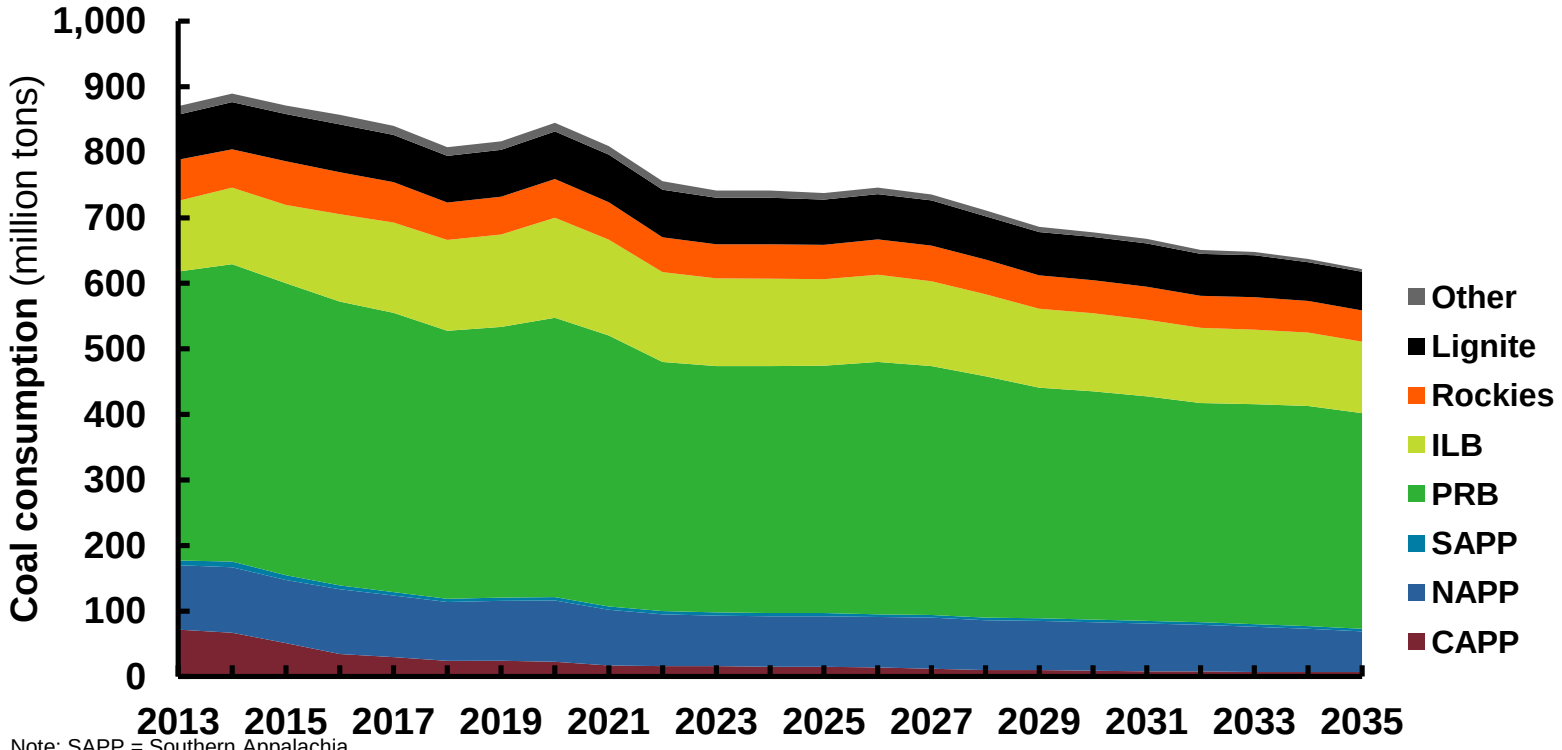


- Coal decreased 36,000 GWh
- Combined Cycle increased 23,000 GWh

- 65 Bcf of Natural Gas Burn @ ~$9/mmBTU
- 32 M tons of coal

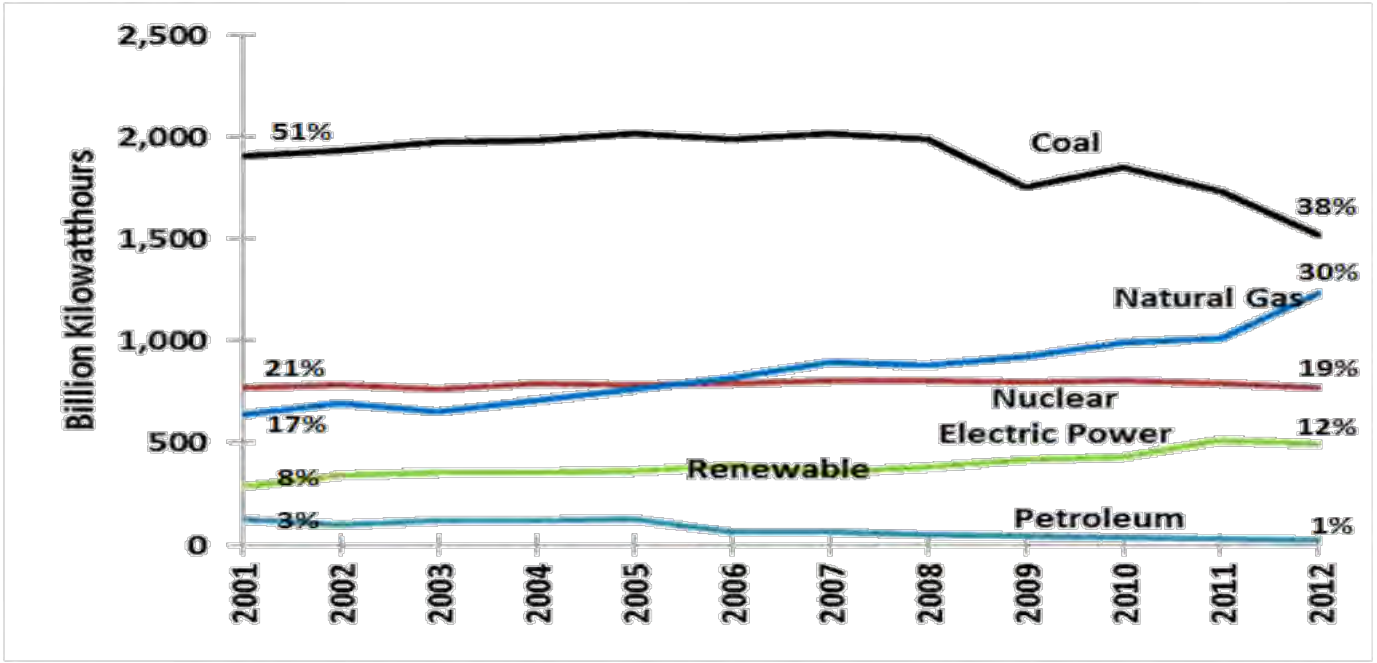
- 225 Bcf of Natural Gas Burn @ ~$4.16/mmBTU
- 16 M tons of coal

Long-term Domestic Thermal Coal Consumption



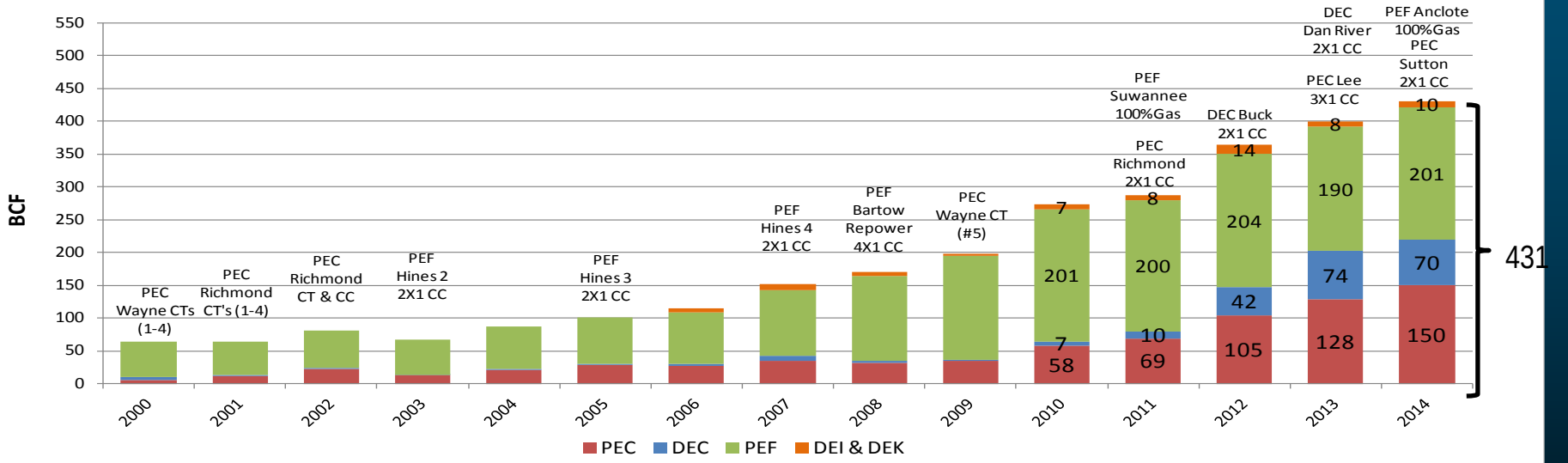
Note: SAPP = Southern Appalachia.
Source: IHS CERA

U.S. Net Electric Power Generation (2001 – 2012)



Source: EIA, *Annual Energy Outlook 2013 Early Release*

Duke Energy Natural Gas Demand*

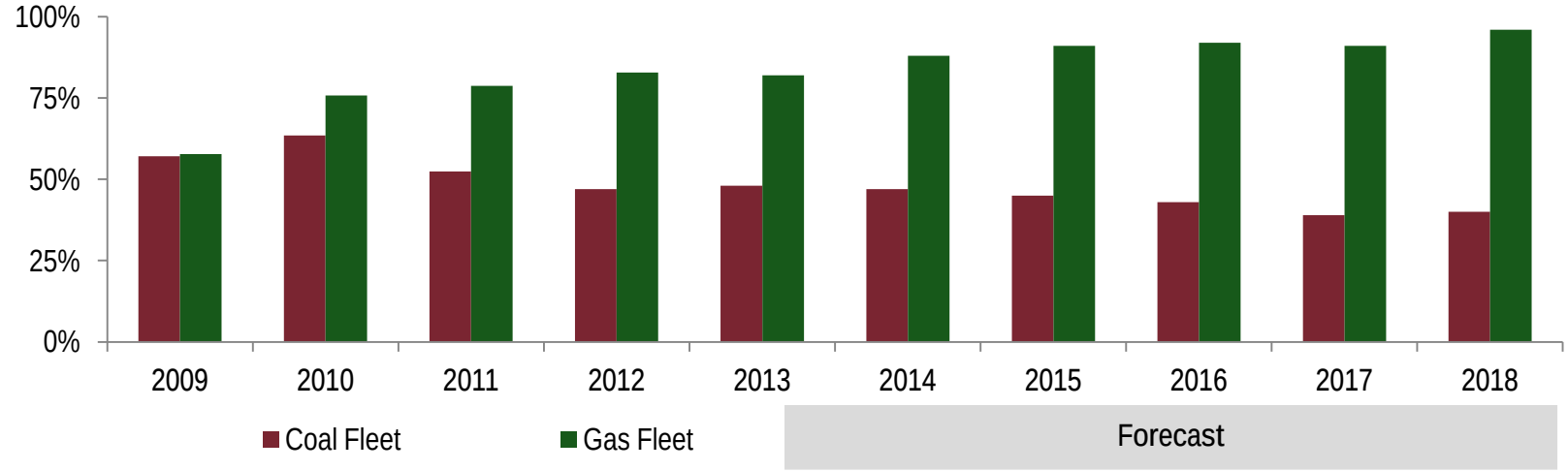


Notes: * Natural gas demand includes tolling obligations

Significant growth in natural gas demand due to CC additions, tolling arrangement and gas conversions.

Duke Energy: Carolinas Regulated Generation Dispatch Trends

Carolinas Coal and Gas Fleet Capacity Factors (1)

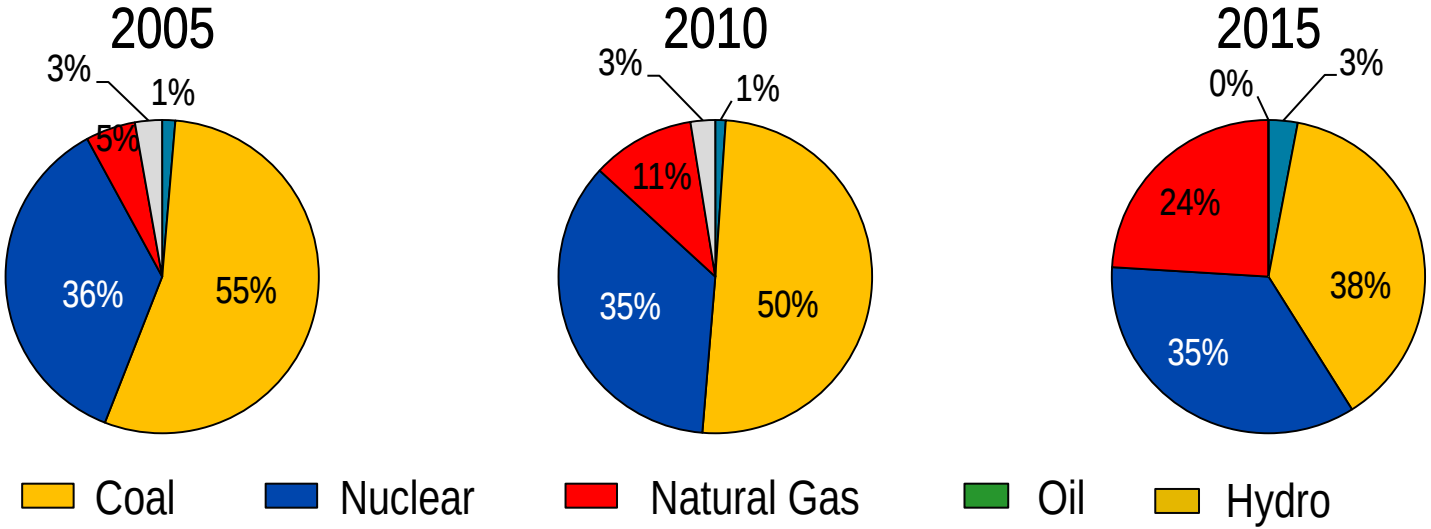


(1) Represents pro forma capacity factors for Duke Energy Carolinas and Duke Energy Progress and illustrative of combined fleet and subject to change based on market conditions, forecasts, and other dynamic system considerations.

NOTE: Annualized illustrative combined cycle capacity factors are estimated based on summer ratings. Actual results are subject to change based on market conditions and other considerations

Scale and diversity provide our fleet with unique flexibility in a changing landscape

Duke Energy Regulated Fleet
Generation by Fuel Type & Emission Reductions

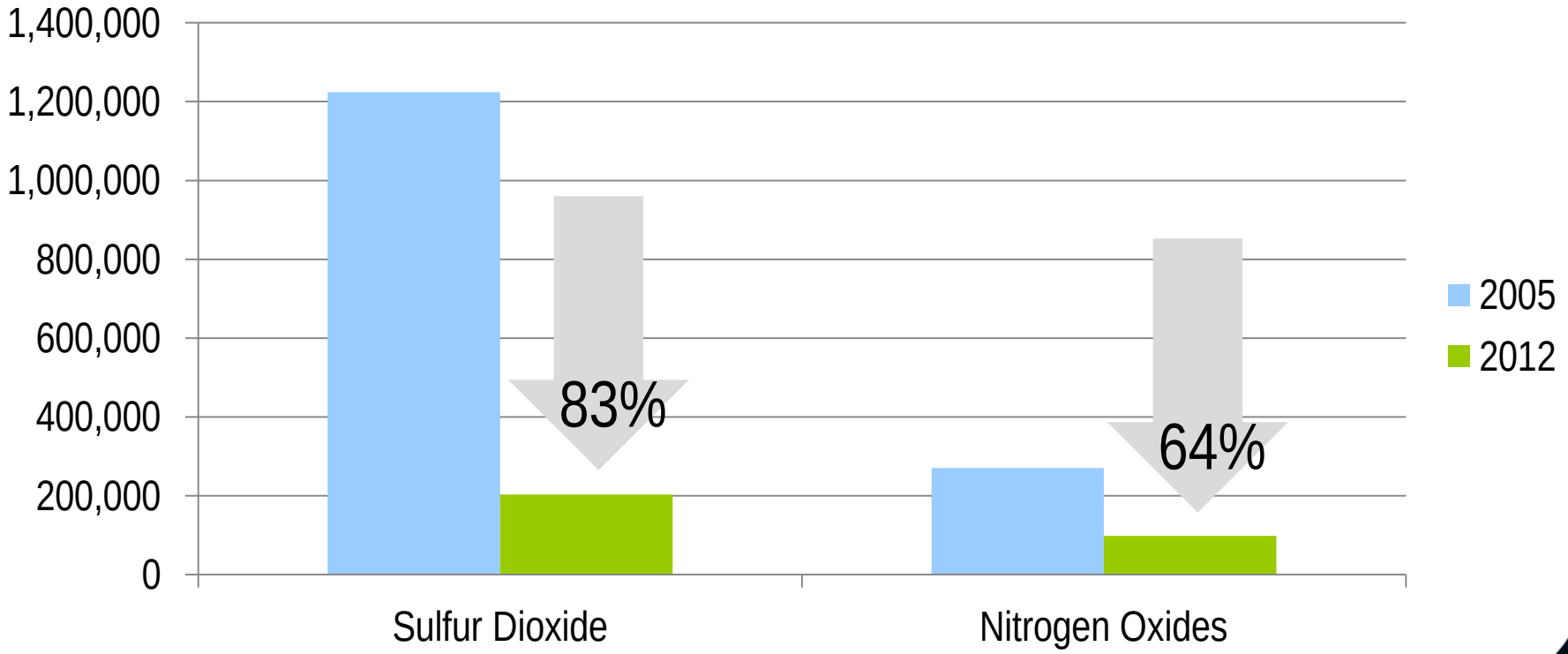


SO_2	1,058,000
NO_x	227,000
CO_2	145,000,000

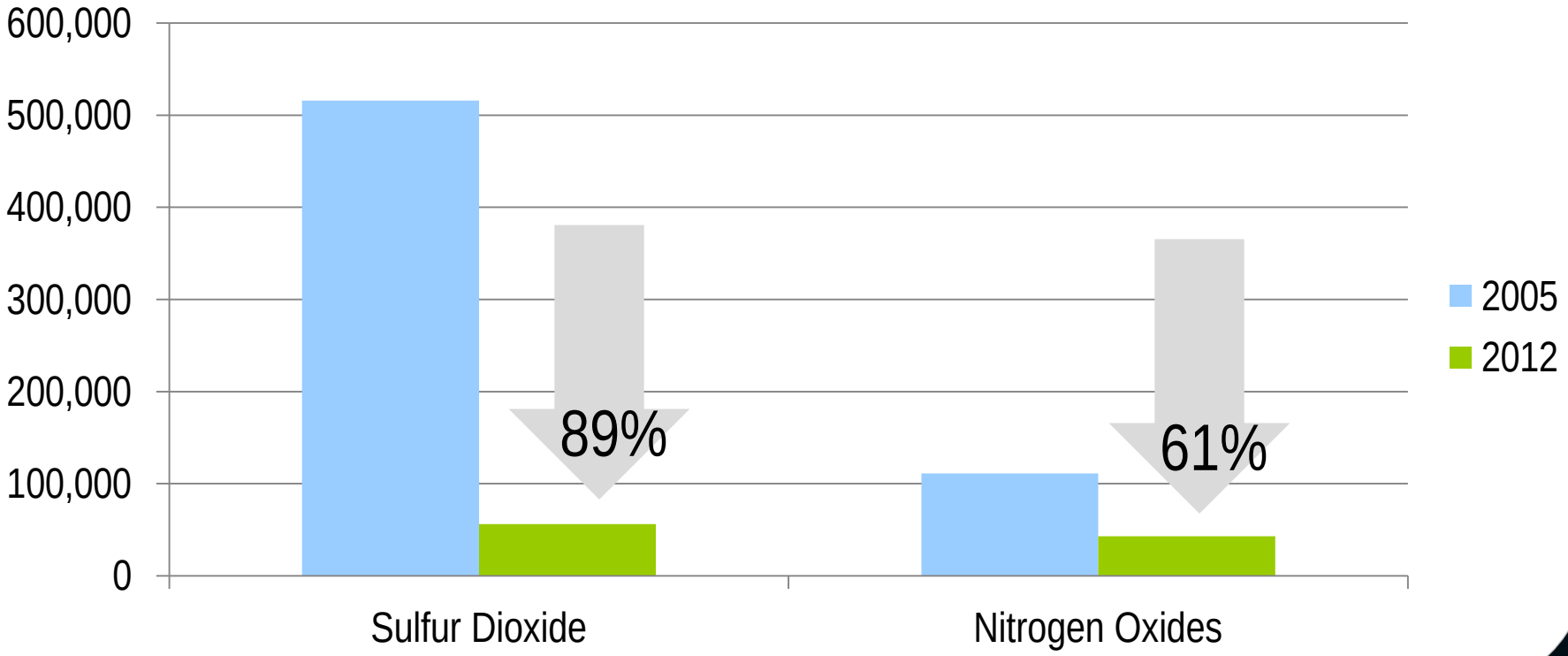
SO_2	277,000
NO_x	98,000
CO_2	140,000,000

SO_2	83,000
NO_x	47,000
CO_2	105,500,000

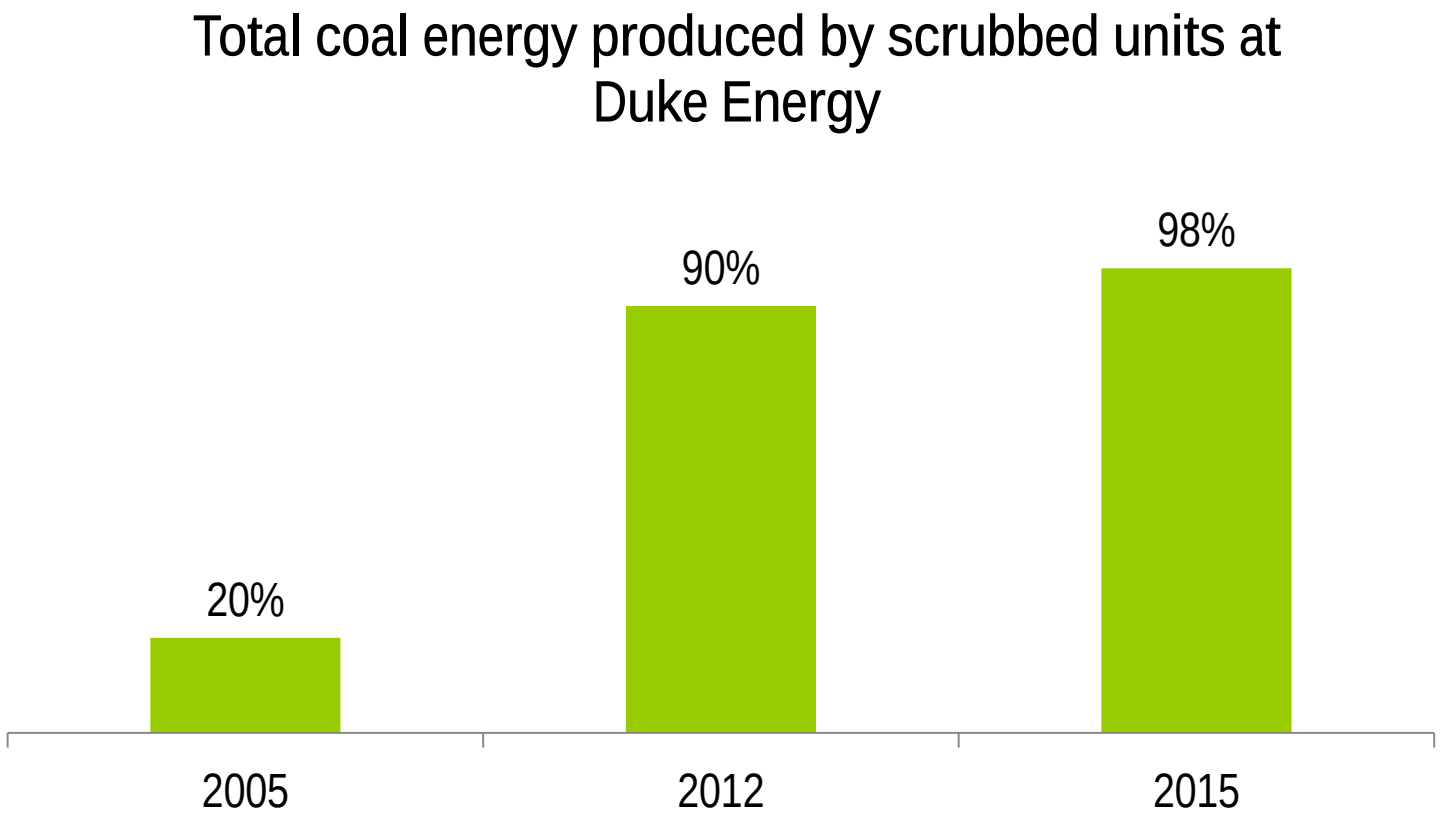
Reducing Emissions: U.S. Fleet



Reducing Emissions: Duke Energy in the Carolinas

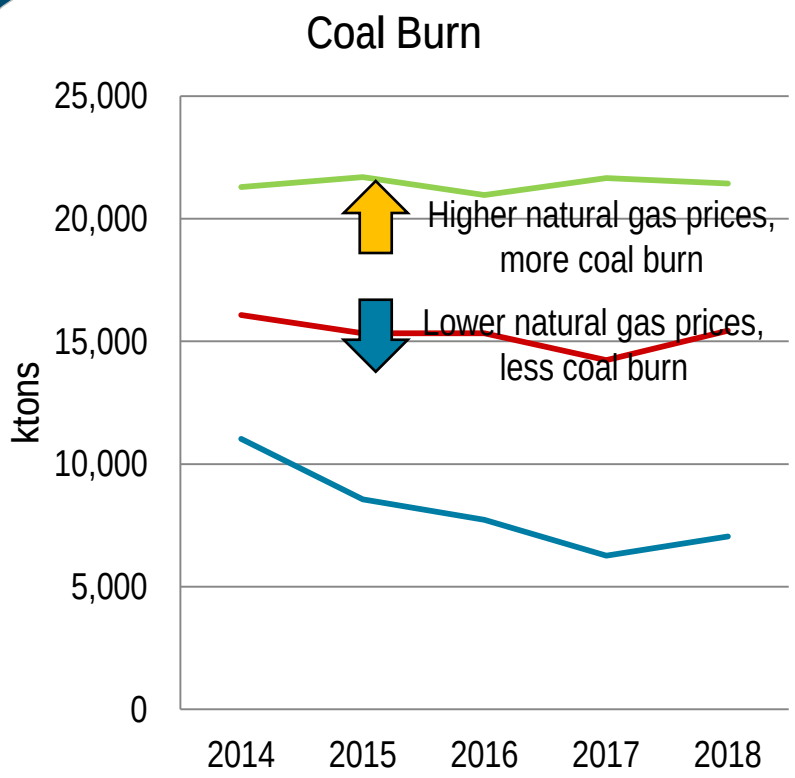


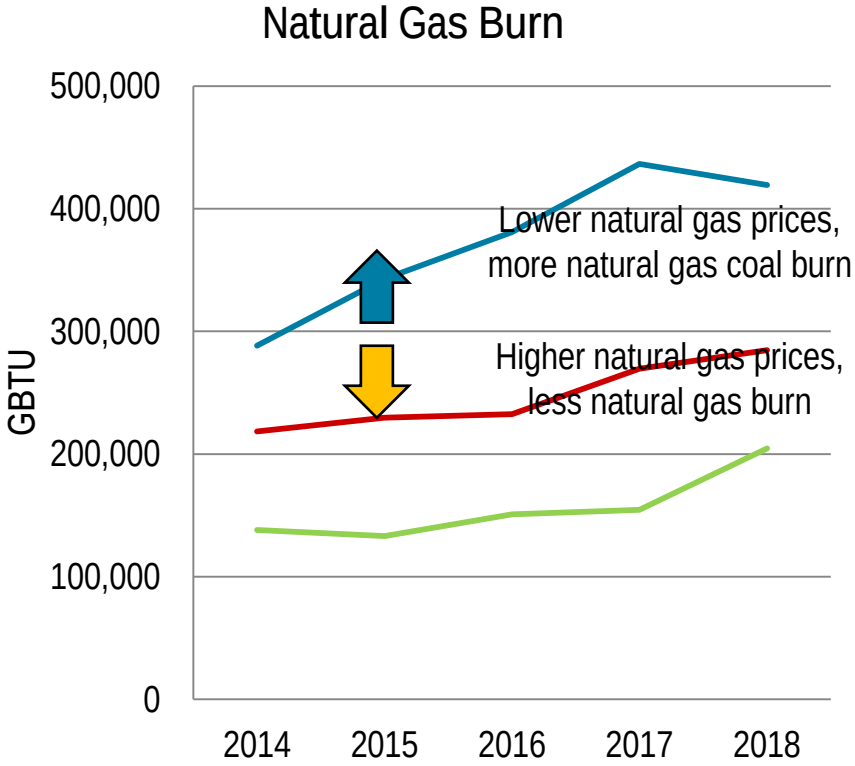
Technology Protects Air



Sensitivity Analysis of Illustrated System Burns

Natural Gas Prices Drive Burn Projections





- Volatility of generation burns challenges procurement and transportation strategies

Gas Market Impacts on Environmental and Resource Planning

- Accelerated retirements of Buck and Riverbend
- Elimination of ACI at multiple Allen units
- Gas versus Nuclear for new build
- Optimization of our SO2 & NOx control removal efficiencies
- More competitive economics of natural gas as a startup fuel

- Industry-wide Nuclear units retiring. What may be next?

- Impacts on combustion turbine technology – increased demand may drive need for more NOx control hi-temp SCRs?

What's Next?

What do you think the next "Game Changer" for electric generation will be?


DUKE
ENERGY®