

# 17<sup>th</sup> INTERNATIONAL CONFERENCE & EXHIBITION ON LIQUEFIED NATURAL GAS (LNG 17)



## Circumstances Influencing the Development and End-use of Natural Gas from Shale Formations in the United States

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**LNG 17, April 17, 2013**



International Organizers



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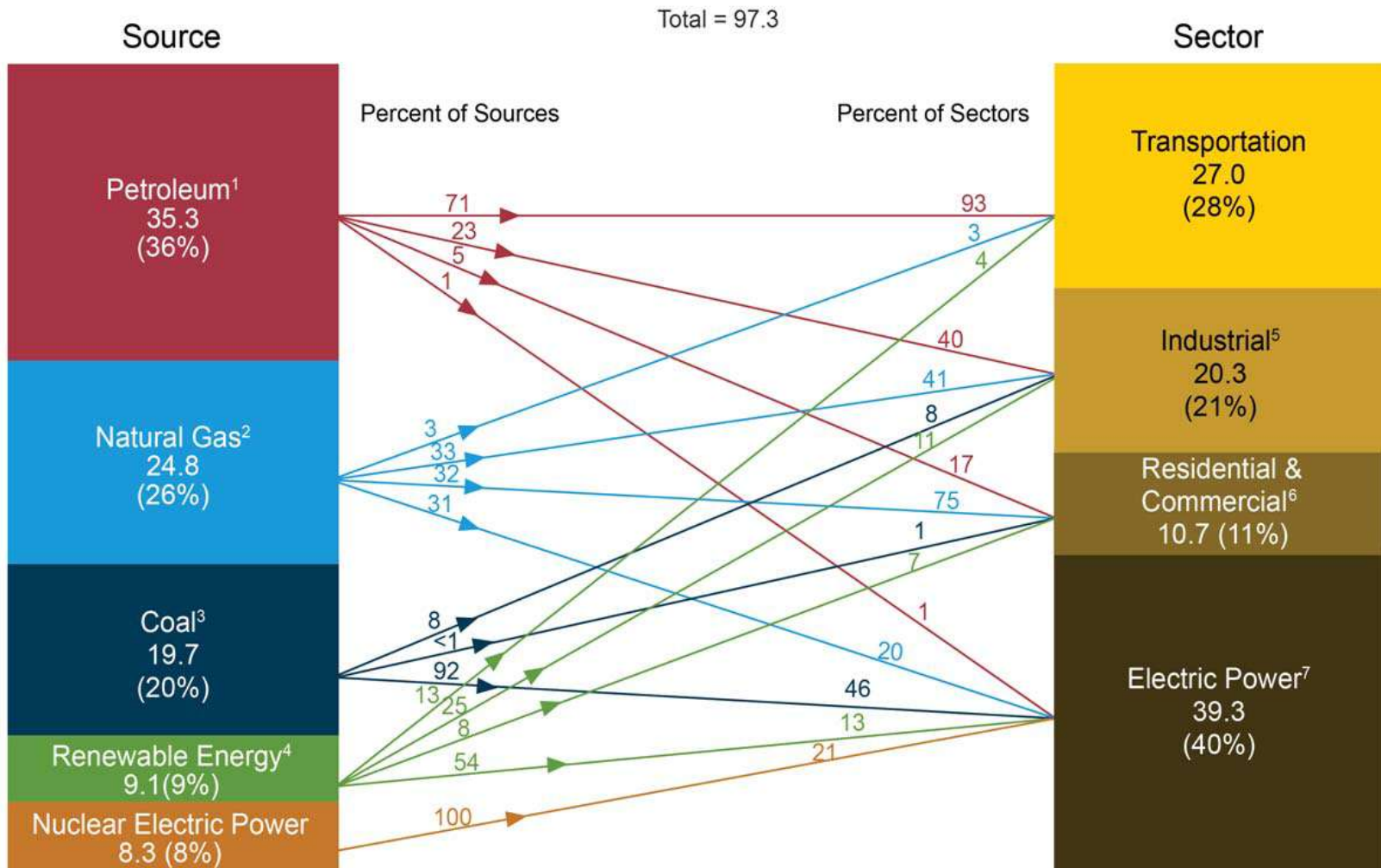
# Outline for Presentation

- U.S. Energy Supply/End Use/Projections
  - Focus on Natural Gas
- The Emerging Contribution from Shale Oil/Gas
  - Impact of Shale Gas on Projected Natural Gas Prices
- Key Circumstances Influencing Shale Development and End-use in the United States
- End-note

# U.S. Supply/Energy Use/ Production

(EIA AEO 2013, Early Release)

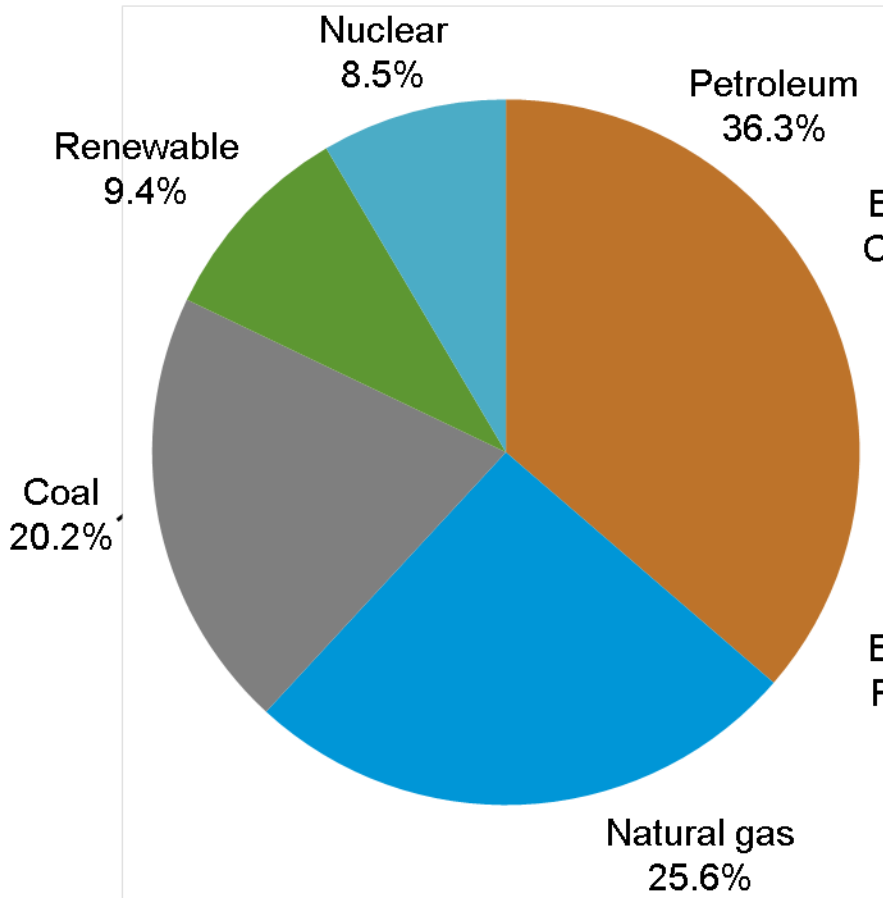
# U.S. Energy Supply and End Use



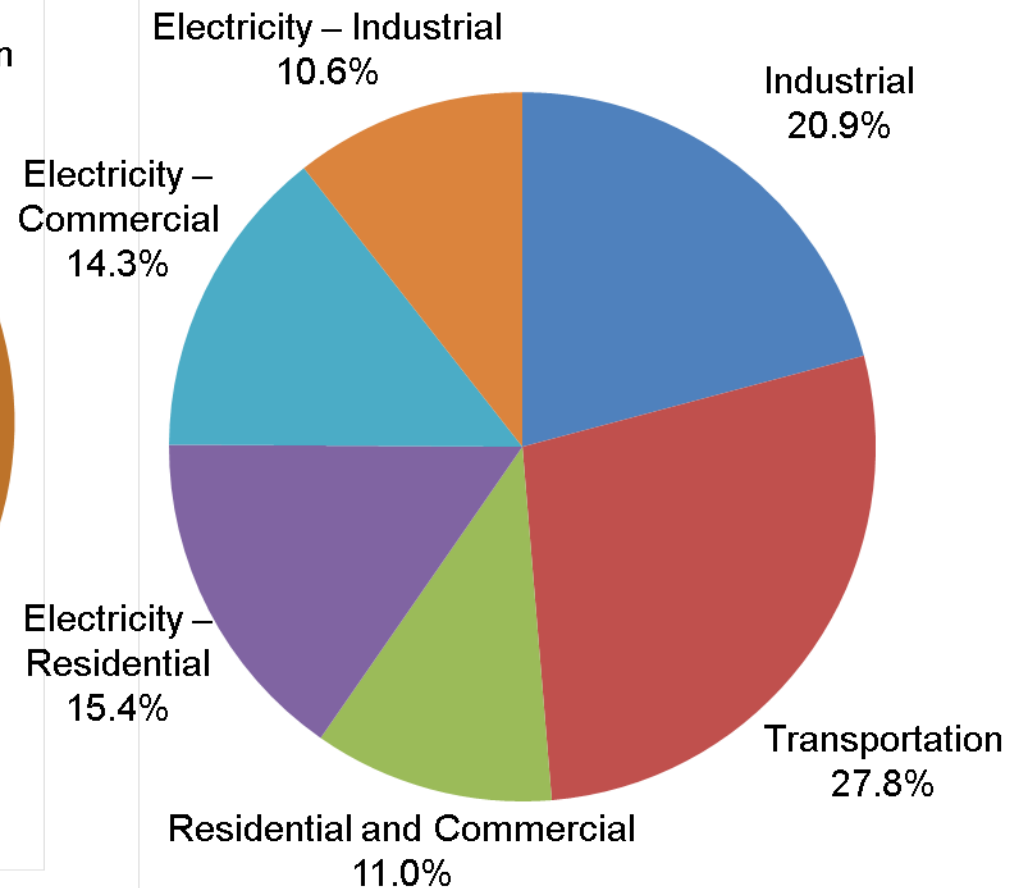
# U.S. Energy Supply and End Use

2011 total U.S. energy use = 97.3 quadrillion Btu

Primary energy demand by fuel



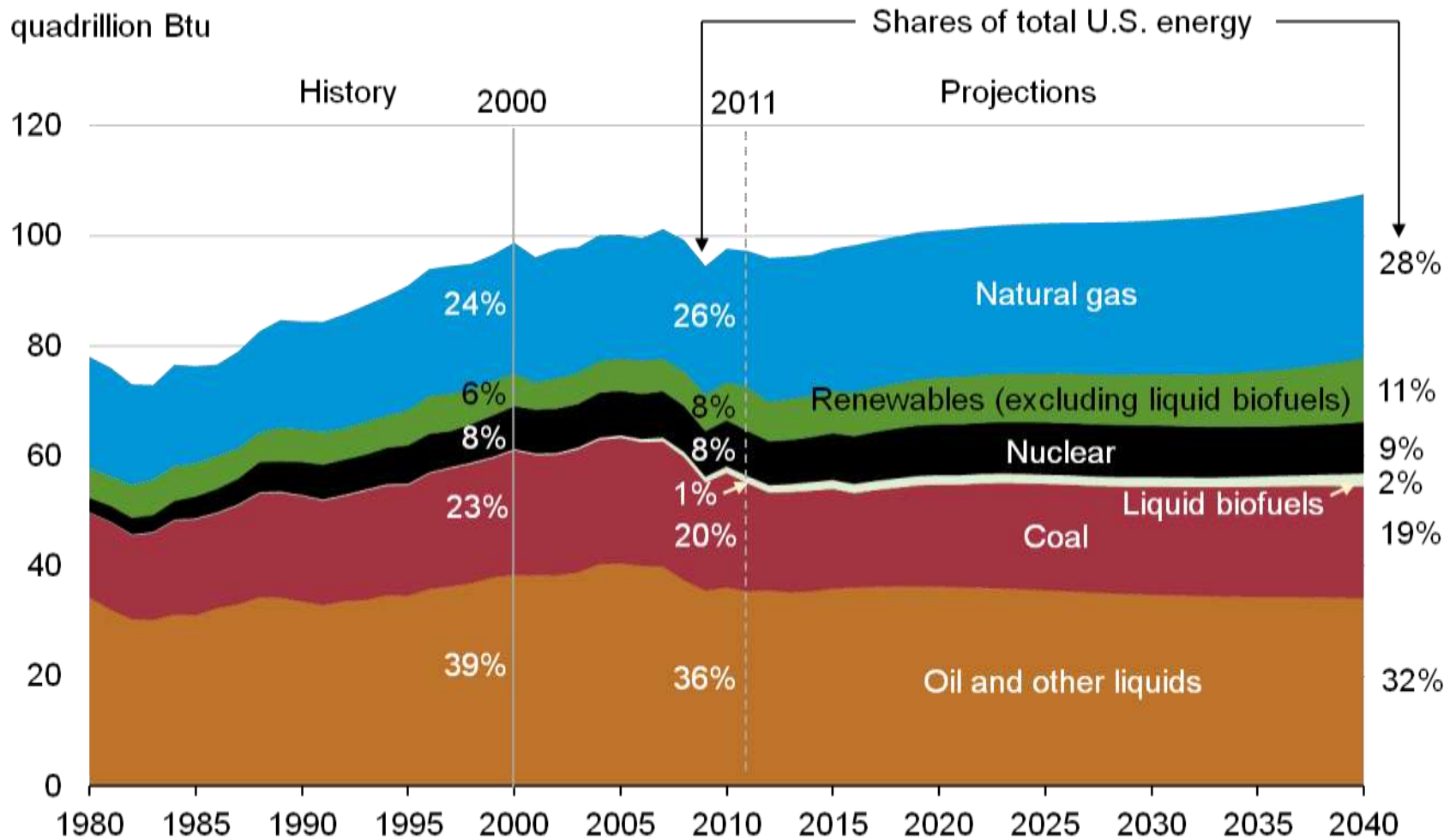
Primary energy demand by sector



Source: EIA, Annual Energy Review 2011

# U.S. Energy Supply Projections

U.S. primary energy consumption  
quadrillion Btu



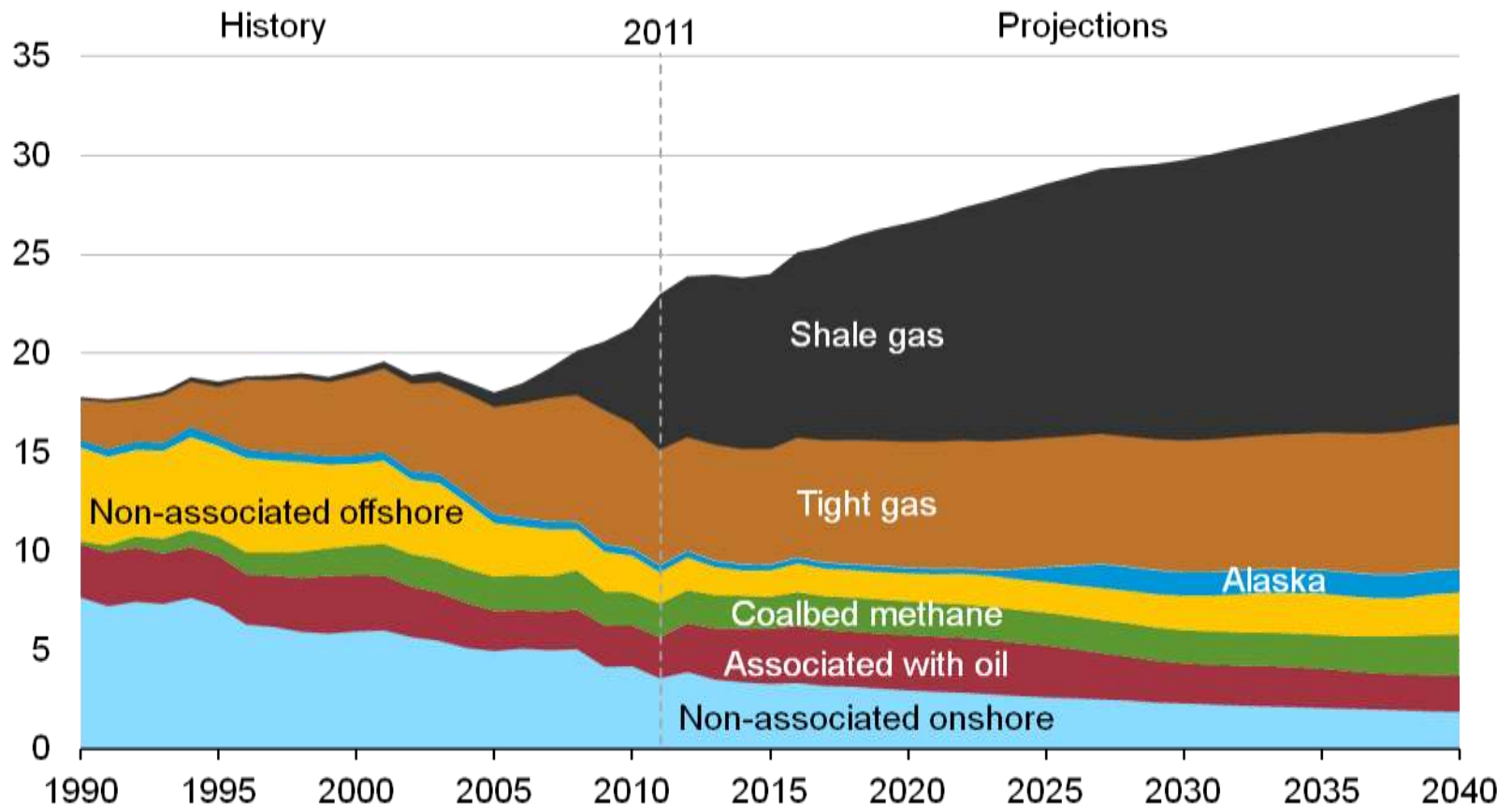
Source: EIA, Annual Energy Outlook 2013 Early Release

# Focus on Natural Gas



# Natural Gas Supply

U.S. dry natural gas production  
trillion cubic feet



Source: EIA, Annual Energy Outlook 2013 Early Release

# U.S. Natural Gas Resources

*U.S. dry gas resources*

*trillion cubic feet*

3,000

2,500

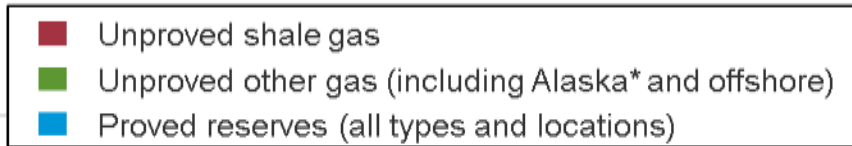
2,000

1,500

1,000

500

0



\*Alaska resource estimates prior to AEO2009 reflect resources from the North Slope that were not included in previously published documentation.

2000

2005

2006

2007

2008

2009

2010

2011

2012

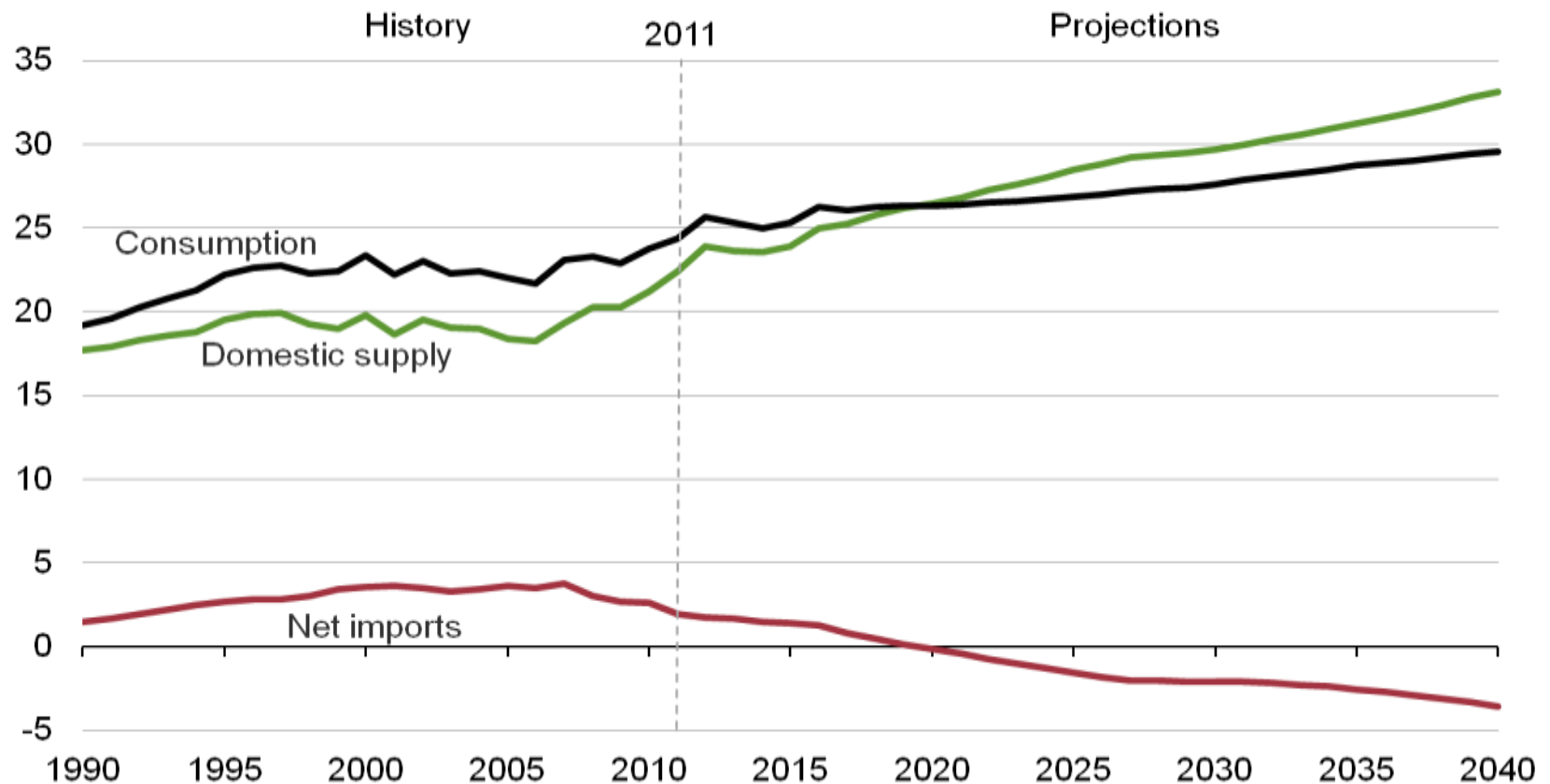
2013

AEO Edition

Source: EIA, Annual Energy Outlook 2013 Early Release

# Natural Gas Supply

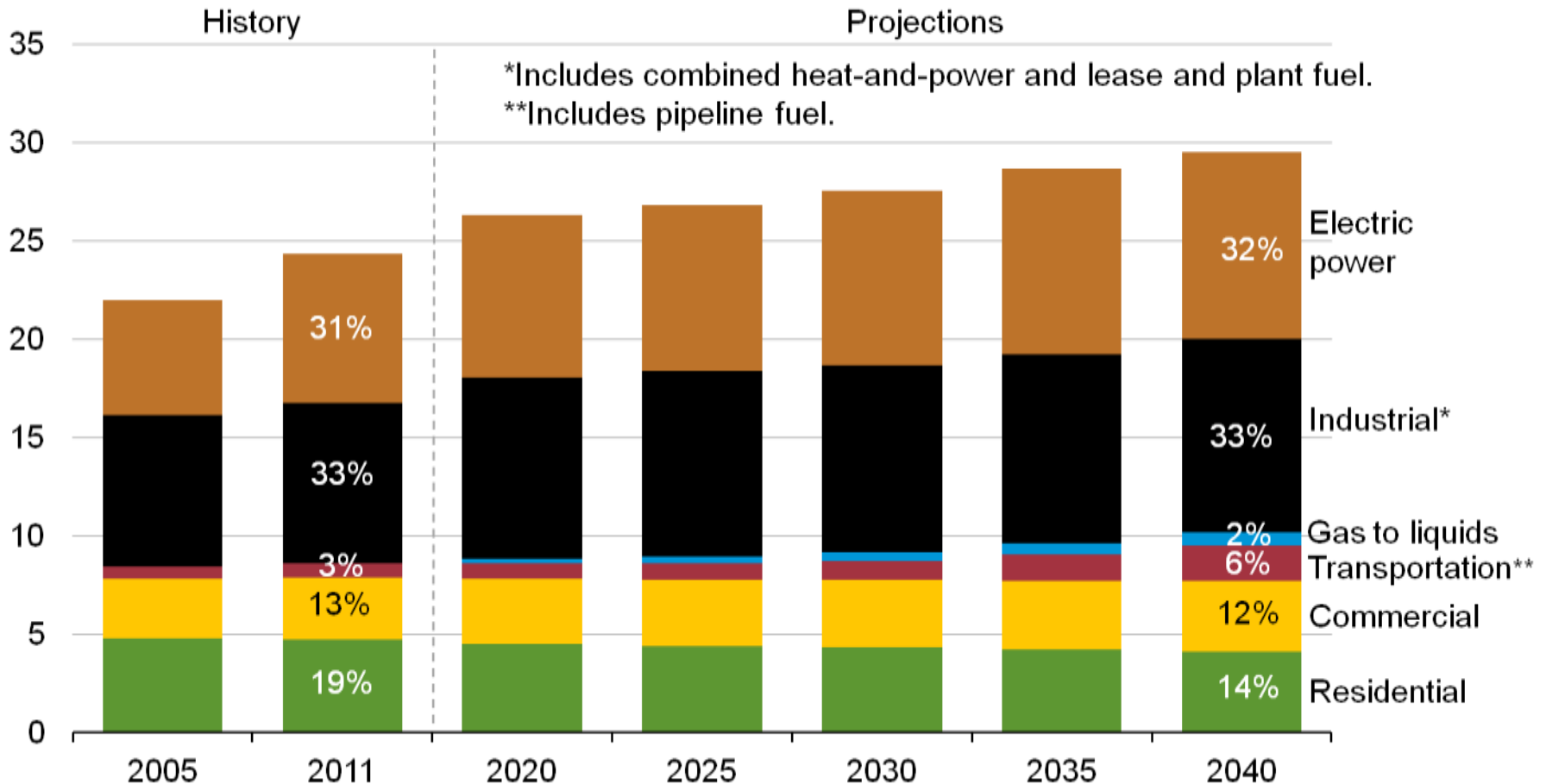
U.S. dry gas  
trillion cubic feet



Source: EIA, Annual Energy Outlook 2013 Early Release

# Natural Gas End Uses

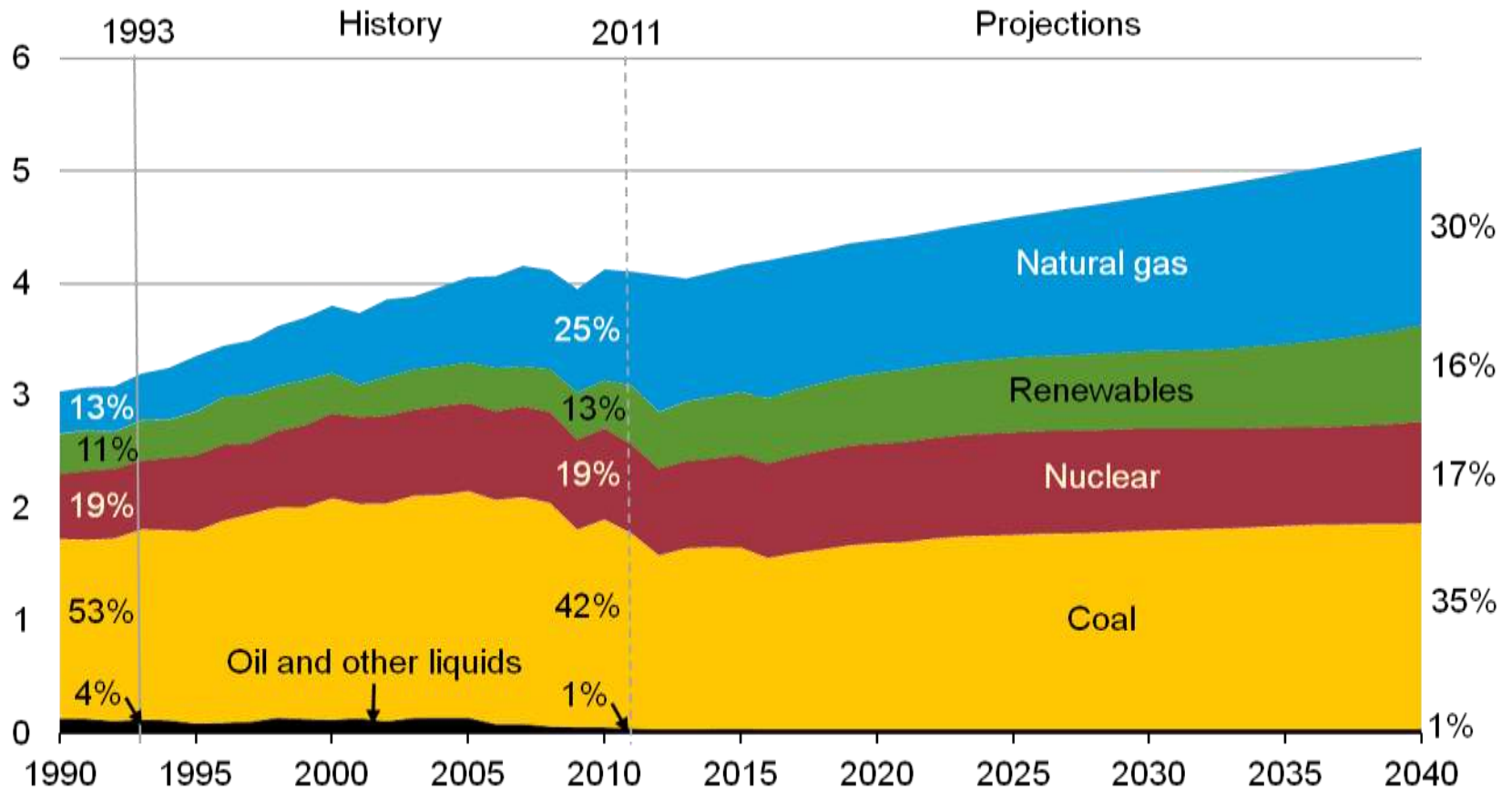
U.S. dry gas consumption  
trillion cubic feet



Source: EIA, Annual Energy Outlook 2013 Early Release

# Generation of Electricity

U.S. electricity net generation  
trillion kilowatthours



Source: EIA, Annual Energy Outlook 2013 Early Release

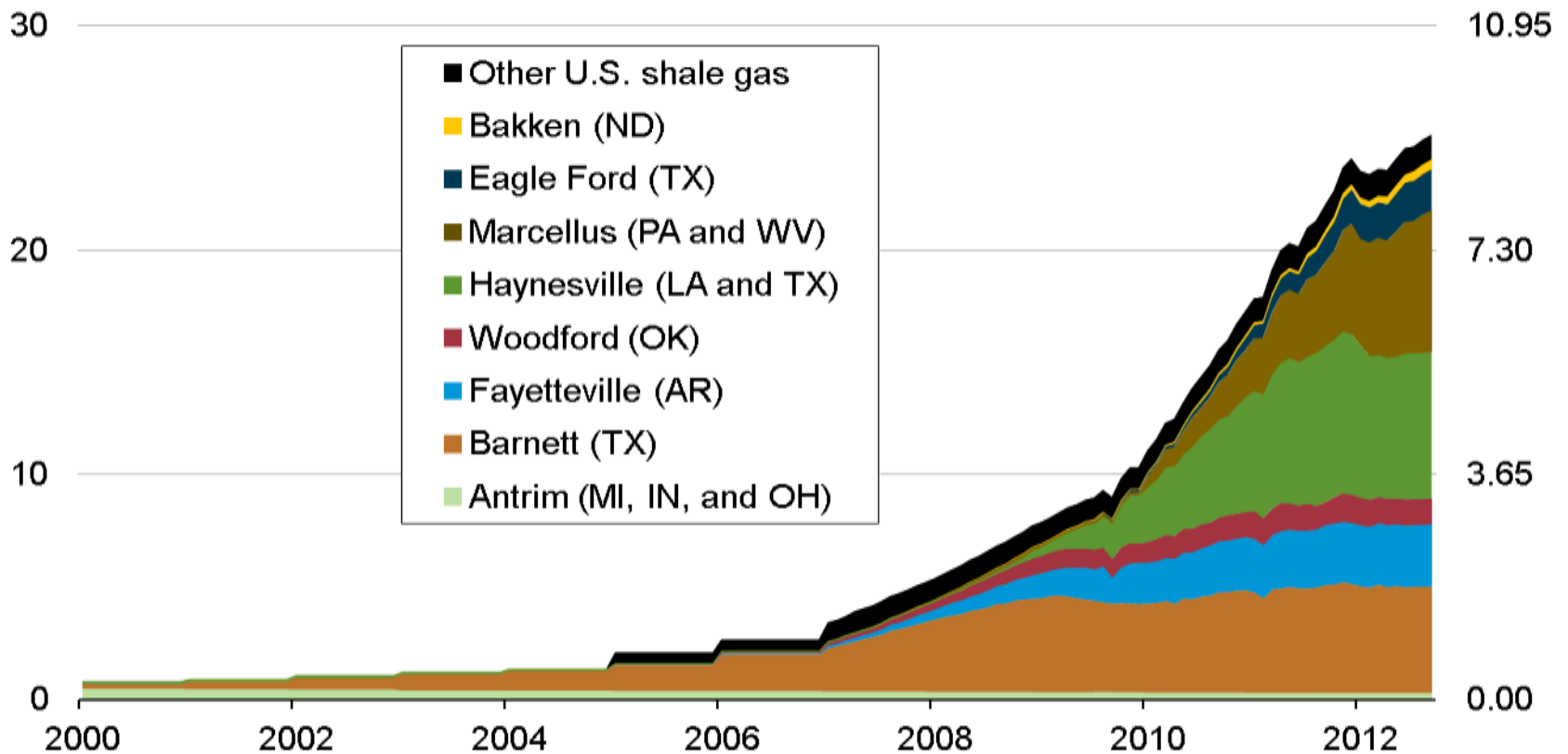
# The Emerging Contribution from Shale Oil/Gas



# Selected Shale Gas Field Production

Shale gas production (dry)  
billion cubic feet per day

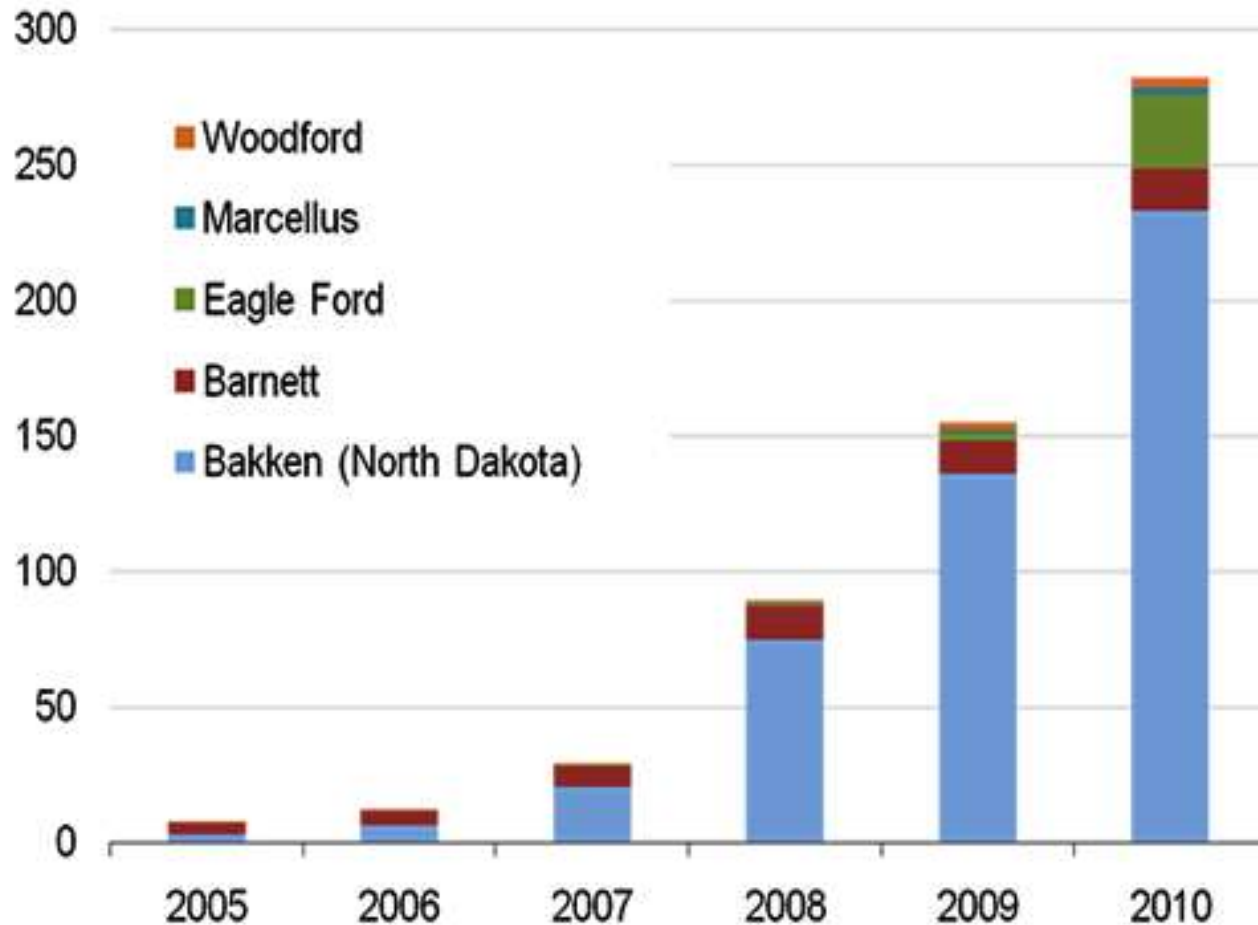
Shale gas production (dry)  
trillion cubic feet



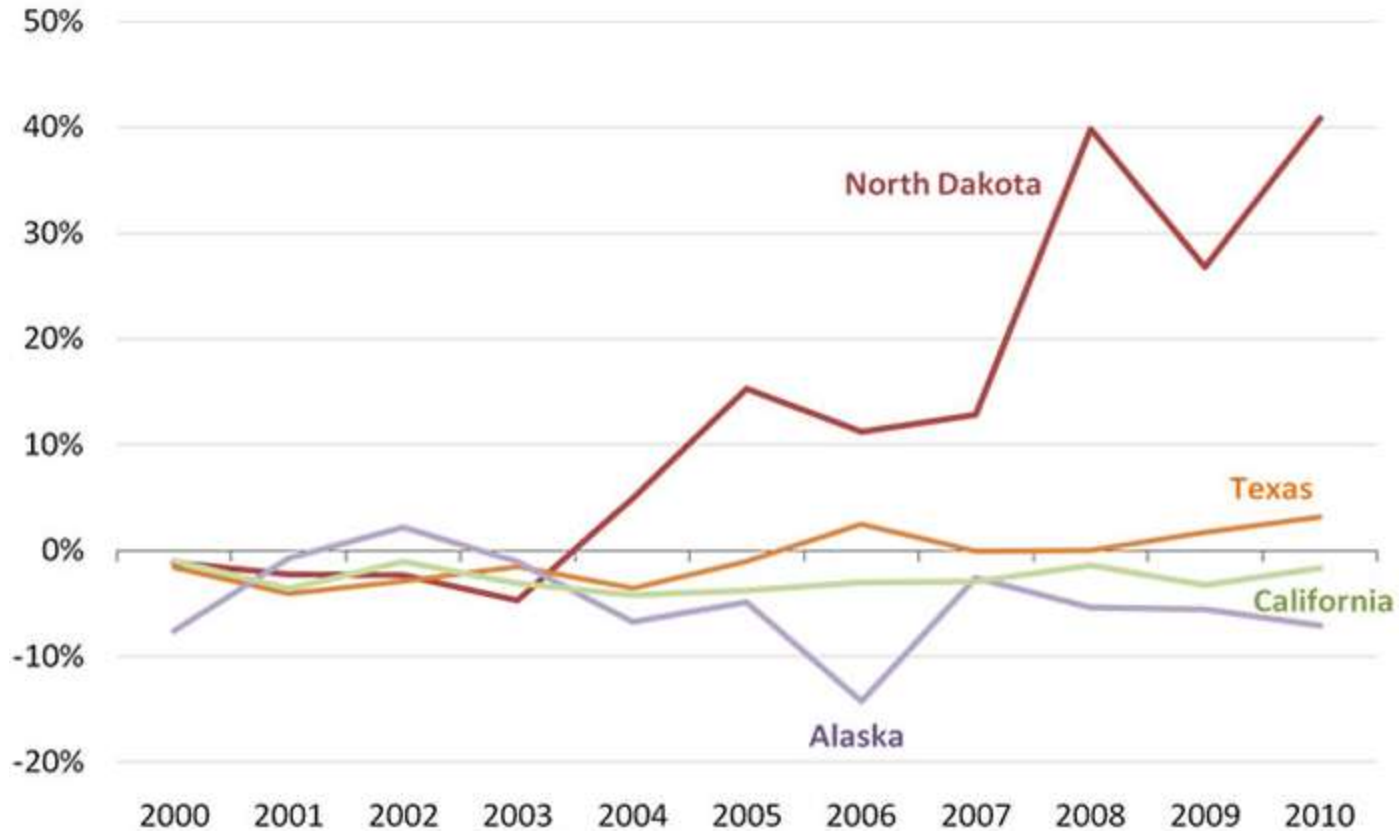
Sources: LCI Energy Insight gross withdrawal estimates as of September 2012 that are converted to dry production estimates with EIA-calculated average gross-to-dry shrinkage factors by state and/or shale play.



# Crude Oil Production from Shale Oil Formations (million barrels)



# Year-to-year Change in Oil Production

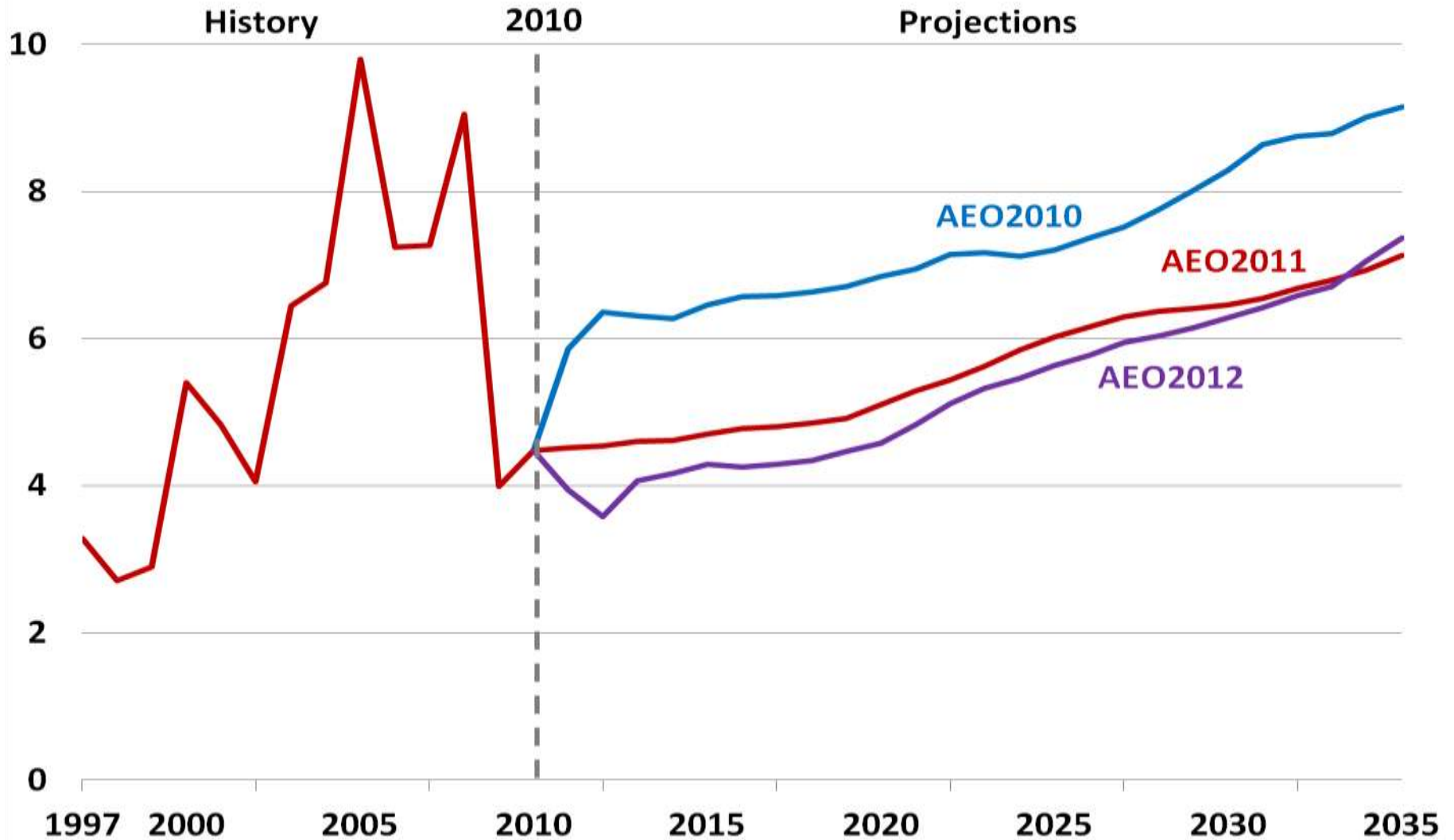


Source: U.S. Energy Information Administration

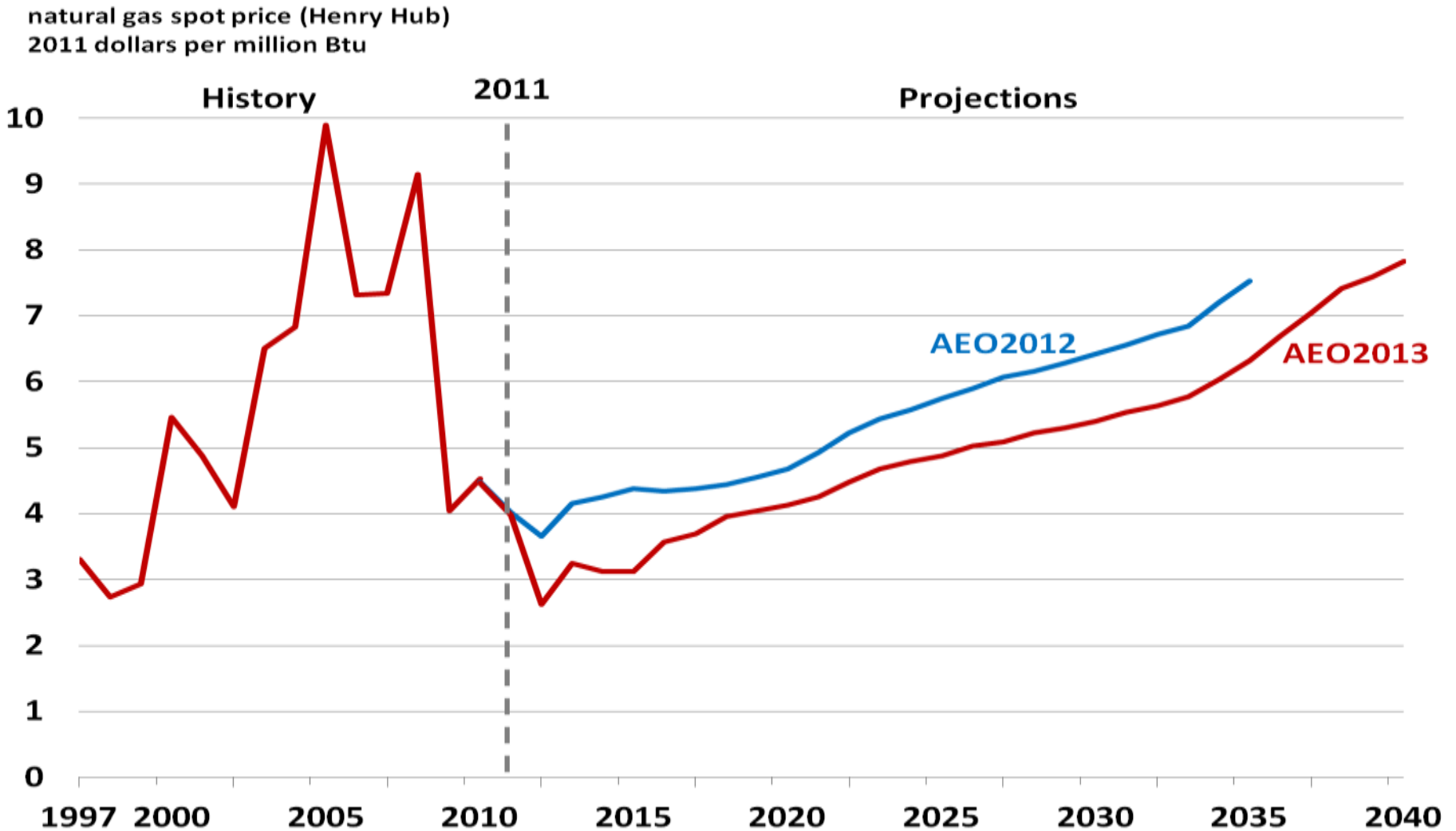
# Impact of Shale Gas on Projected Natural Gas Prices

# Natural Gas Price (AEO 2012)

natural gas spot price (Henry Hub)  
2010 dollars per million Btu



# Natural Gas Price (AEO 2013)



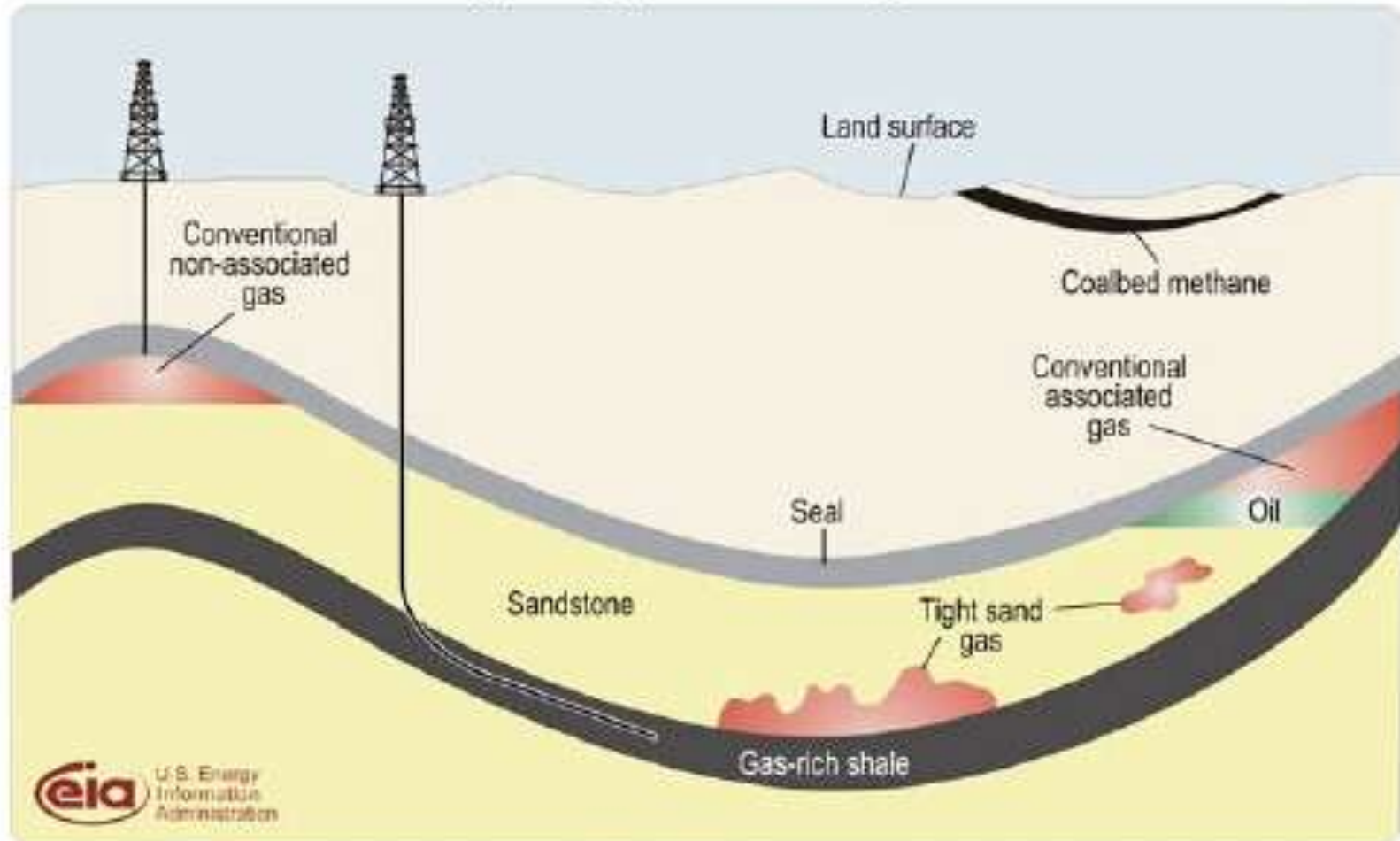
# Key Circumstances Influencing Shale Development

# Key Circumstances

- Mixed and Overlapping Government Jurisdiction (Federal, State, local, Regional)
- The Roles of Government Branch: Oversight and Regulation (Executive, Legislative, Judicial)
- Infrastructure: Pipelines, Terminals, Facilities
- Public Perception and Acceptance/the Process of Shale Development

# Natural Gas Development/Production

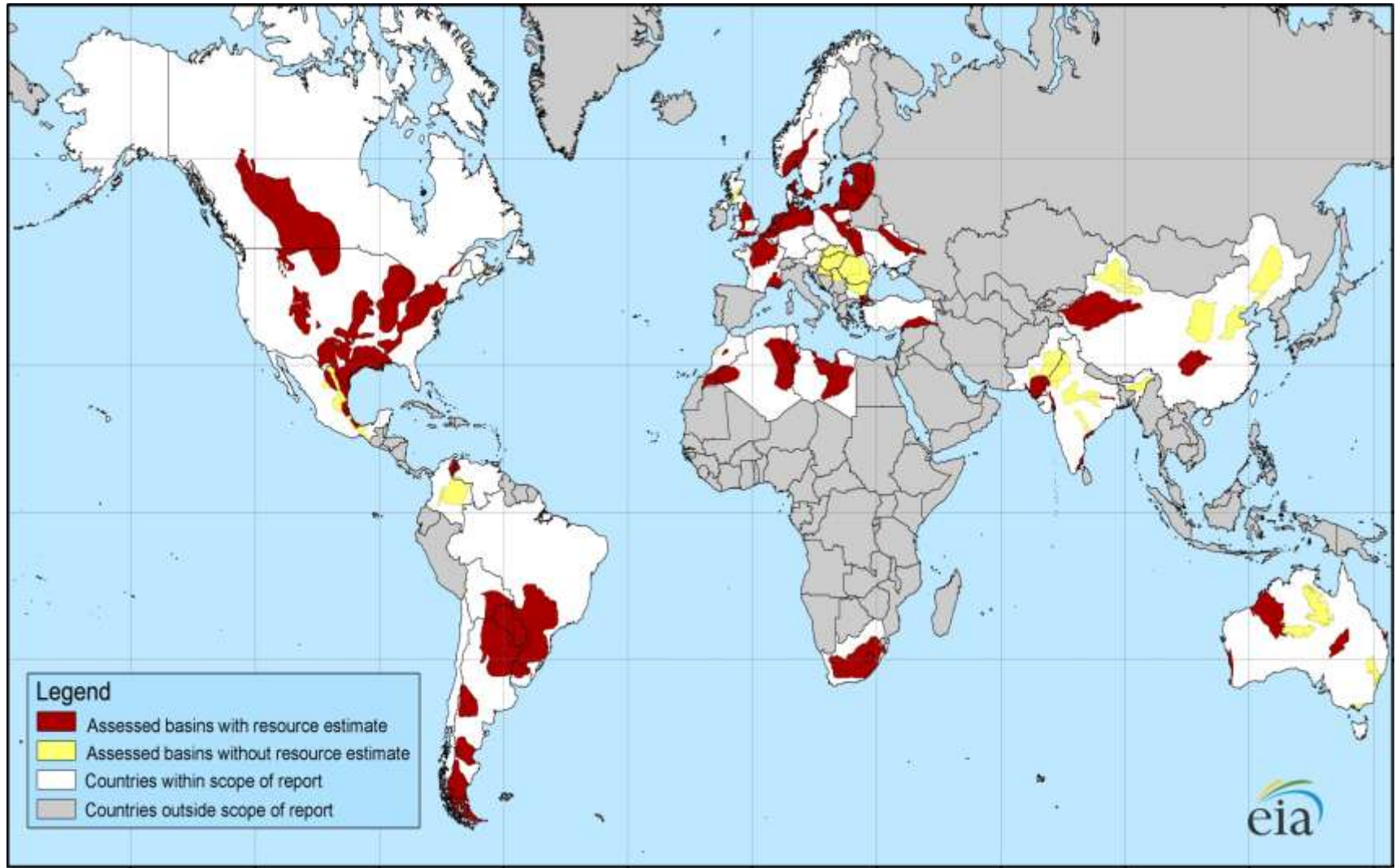
Schematic geology of natural gas resources





# **World Shale Gas Resources: An Initial Assessment**

# Shale Gas in 48 Major Basins, 32 Countries



Source: U.S. Energy Information Administration

# Findings

- Some countries that currently produce natural gas, have large resource estimates of shale gas (U.S., Canada, Arg., Mexico, China, Australia, Libya, Algeria, Brazil)
- Some countries are dependent on imports, but have significant shale gas resources relative to their production/consumption (France, Poland, Turkey, Ukraine, Chile Morocco, South Africa)

# End Note

- Potential for Increased U.S. Shale Oil/Gas Development and End Use

# Questions , Comments , ... ?

Schematic geology of natural gas resources

