

# Energy Outlook



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*For*

*NY Energy Forum*

*October 29, 2013 | New York, NY*

*By*

*Adam Sieminski, Administrator*

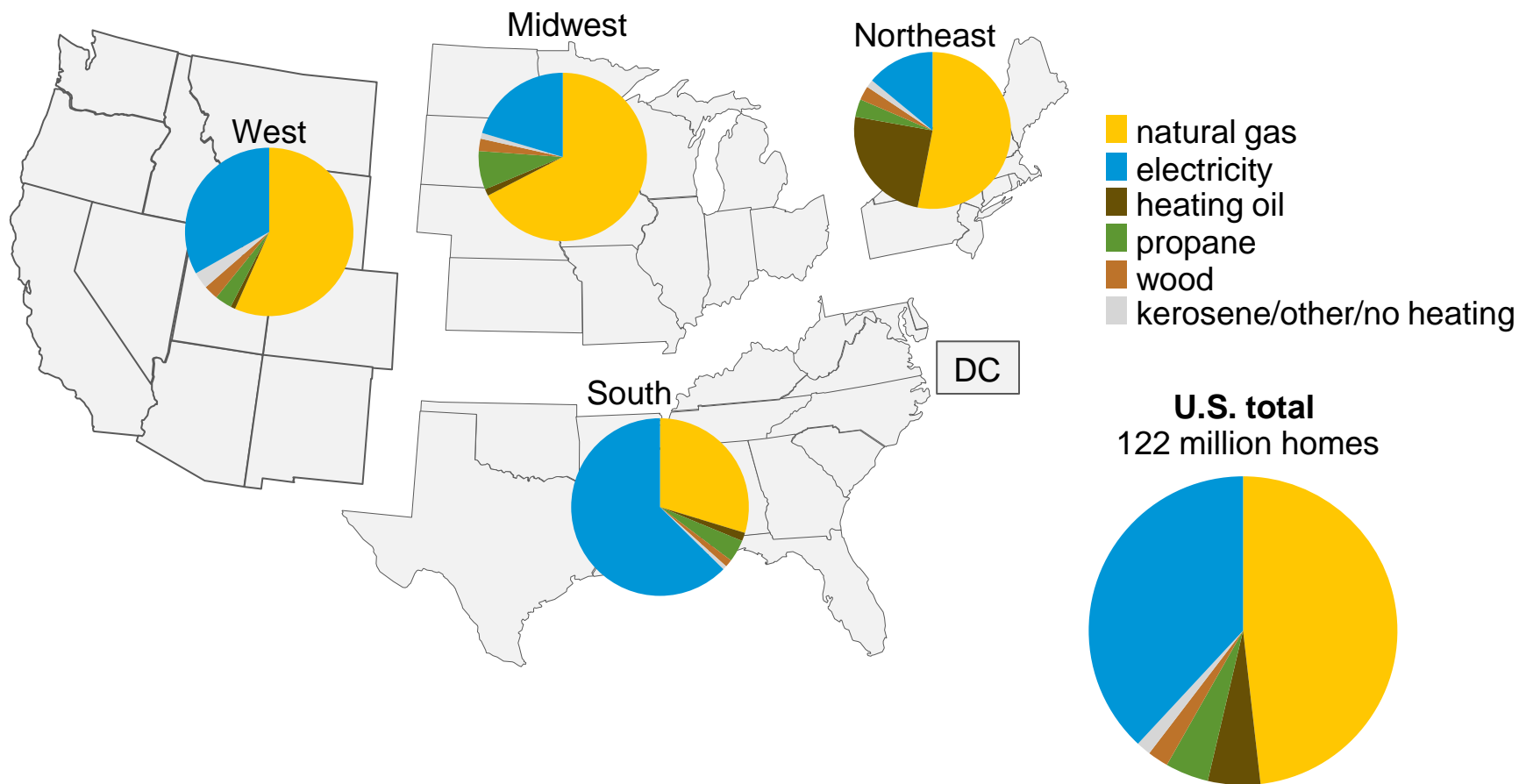
# Agenda

- Winter Fuels Outlook
- Drilling Productivity Report
- Geopolitical implications of shale
- International Energy Outlook

# EIA Winter Fuels Outlook

# Heating fuel market shares vary regionally

Share of homes by primary space heating fuel and Census Region



Source: U.S. Census Bureau, 2012 American Community Survey

Expenditures are expected to be higher this winter (October 1– March 31) for natural gas, propane, electricity; lower for heating oil

Percent change in fuel bills from last winter (forecast)

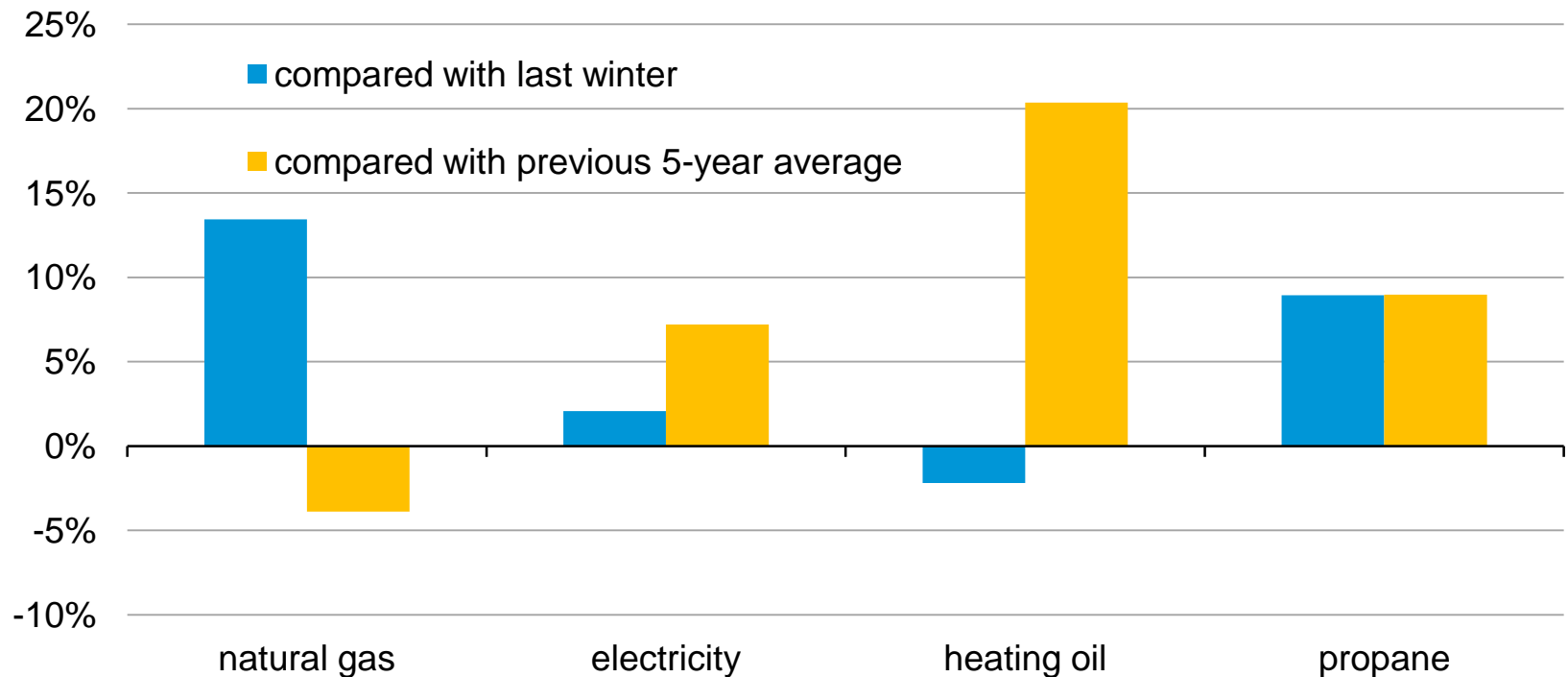
Fuel bill	Base case forecast	If 10% warmer than forecast	If 10% colder than forecast
Heating oil	<b>-2</b>	<b>-13</b>	<b>9</b>
Natural gas	<b>13</b>	<b>3</b>	<b>25</b>
Propane *	<b>9</b>	<b>-</b>	<b>-</b>
Electricity	<b>2</b>	<b>-1</b>	<b>6</b>

\* Propane expenditures are a volume-weighted average of the Northeast and Midwest regions. All others are U.S. volume-weighted averages. Propane prices in warm and cold cases are not available.

Source: EIA Short-Term Energy Outlook, October 2013

# Although forecast natural gas expenditures are significantly higher, they are still lower than the previous 5-year average

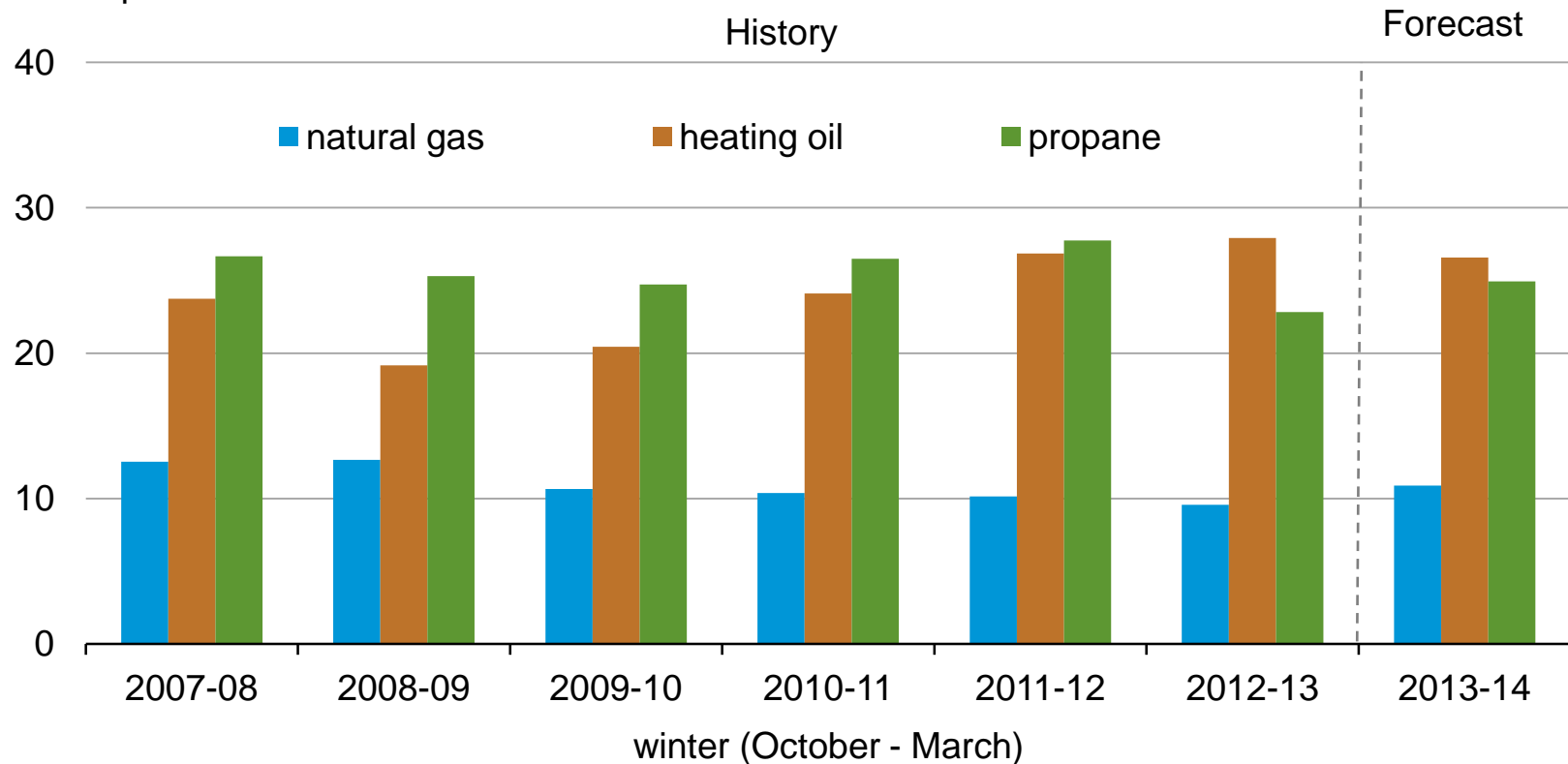
% change in fuel expenditures



Note: All prices are U.S. averages except propane, which is an average of Northeast and Midwest prices  
Source: EIA Short-Term Energy Outlook, October 2013

The differences between natural gas, heating oil, and propane prices narrow this winter, with natural gas price 14% higher, heating oil price down 5%, and propane price up 9%

U.S. average residential winter heating fuel prices  
dollars per million Btu



Source: EIA Short-Term Energy Outlook, October 2013

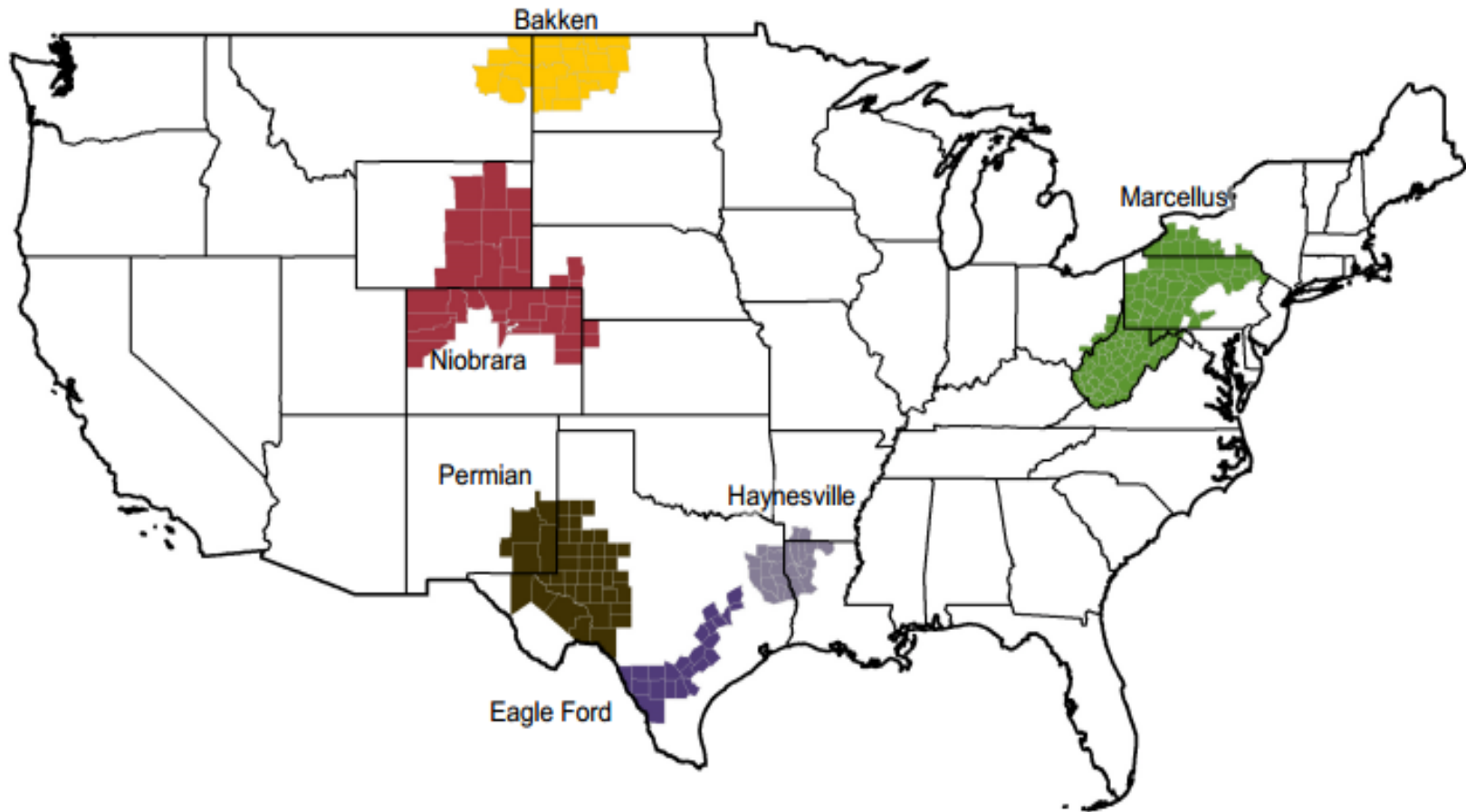
## Key insights of the winter fuels outlook

- EIA expects higher prices this winter for homes that heat with natural gas, propane, and electricity; home heating oil prices are expected to be lower than last winter
- Forecast temperatures are close to last winter with the Northeast about 3% colder and the West 3% warmer
- Projected changes in residential expenditures from last winter are:
  - 13% higher for homes that heat primarily with natural gas
  - 9% higher for propane
  - 2% higher for electricity
  - 2% lower for heating oil
- Although natural gas expenditures are significantly higher, they are still lower than the previous 5-year average



# EIA Drilling Productivity Report

## Six key plays account for nearly all recent growth in production



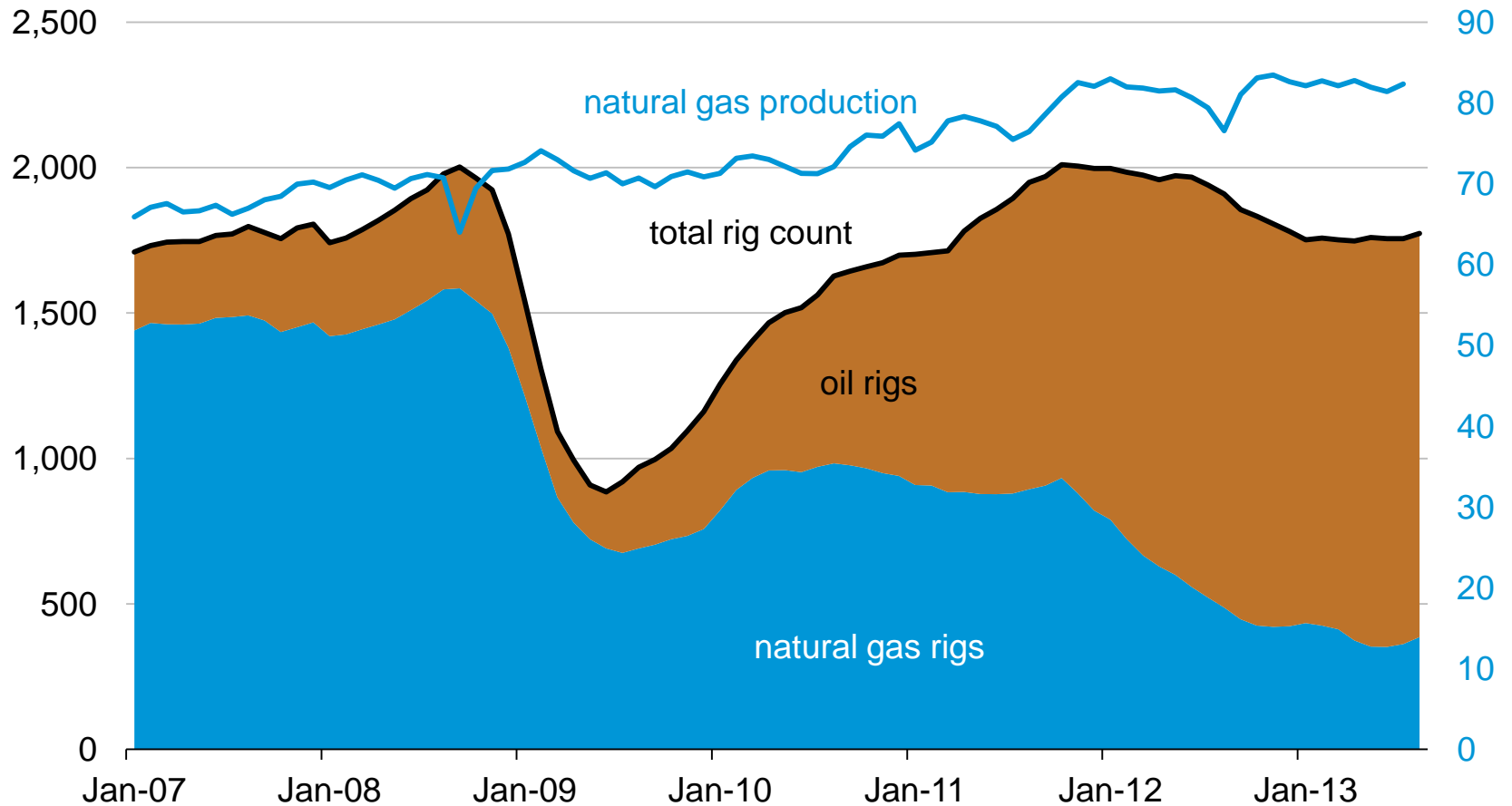
Source: EIA Drilling Productivity Report

# The gas-directed rig count plummeted in 2009 but natural gas production did not follow

oil and natural gas rig count and natural gas production

U.S. rig count

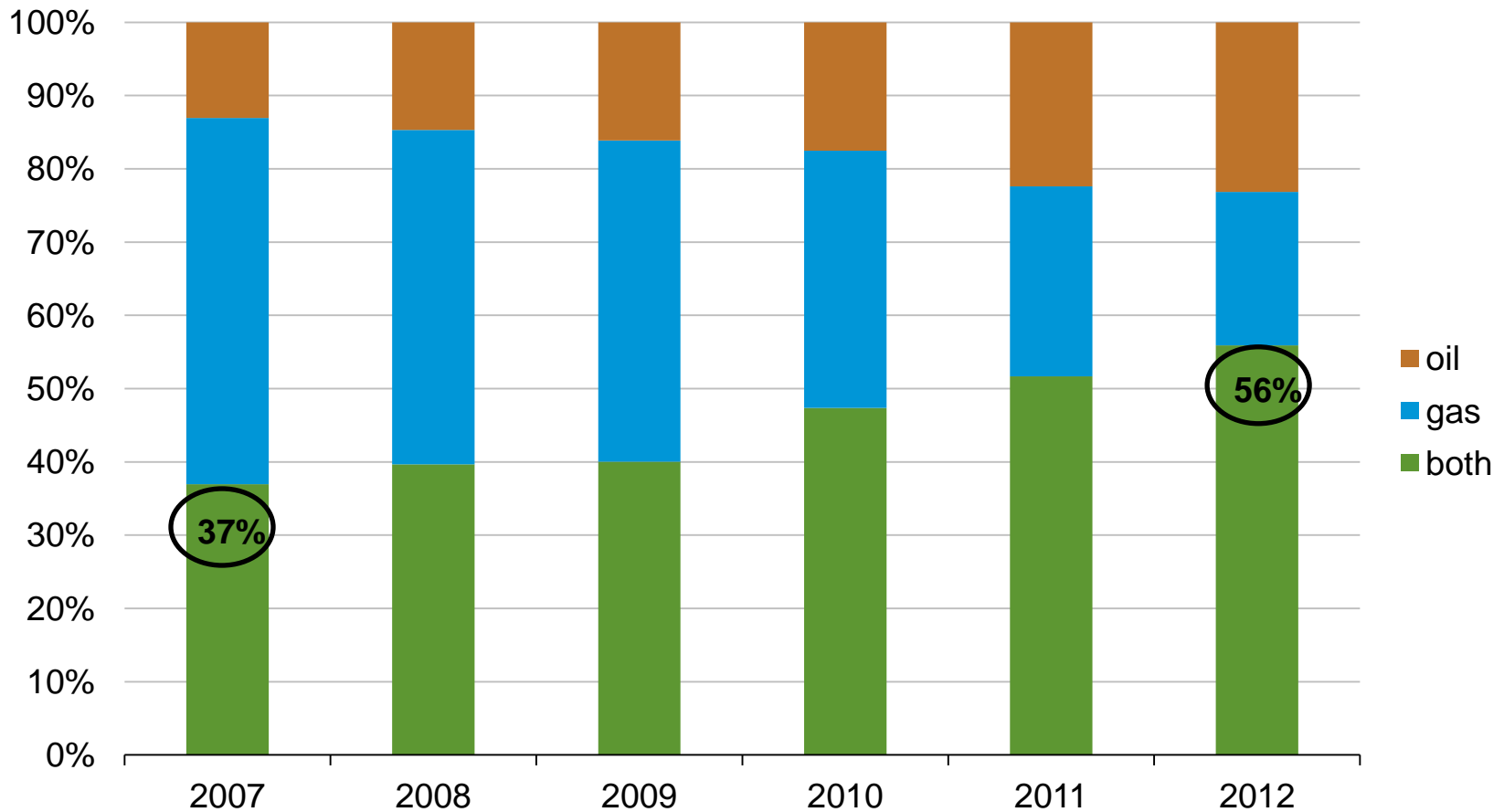
billion cubic feet per day



Source: Baker Hughes, Inc. rig count, EIA Short-Term Energy Outlook

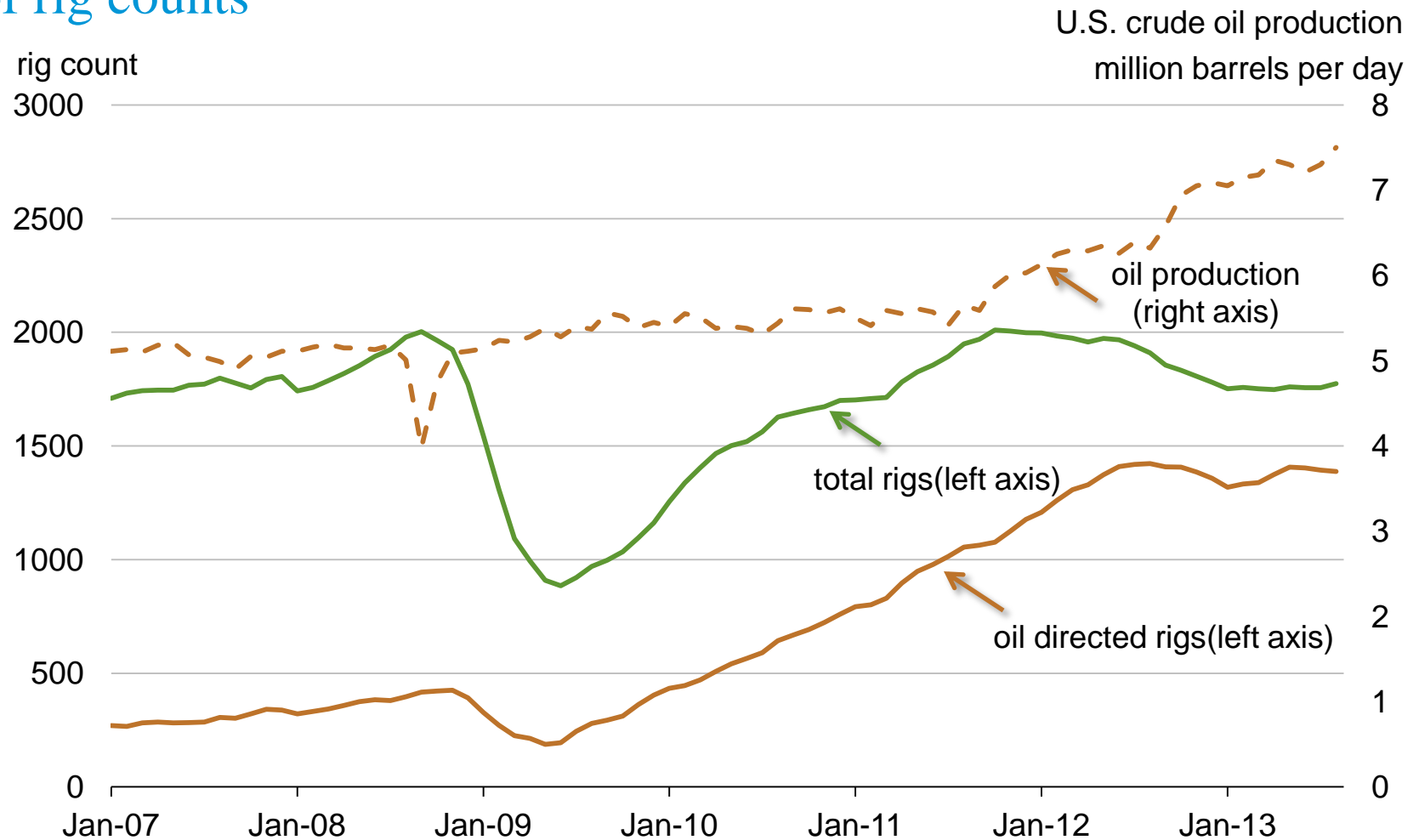
# Oil and natural gas are increasingly developed from the same wells

share of new wells by type of hydrocarbons produced



Source: EIA analysis of data from DrillingInfo, Inc.

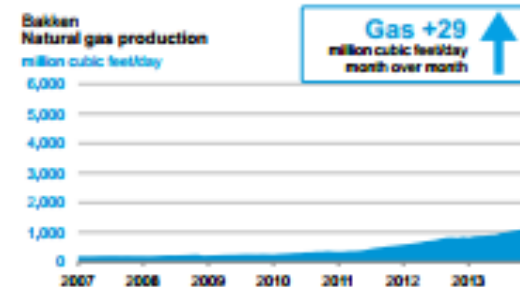
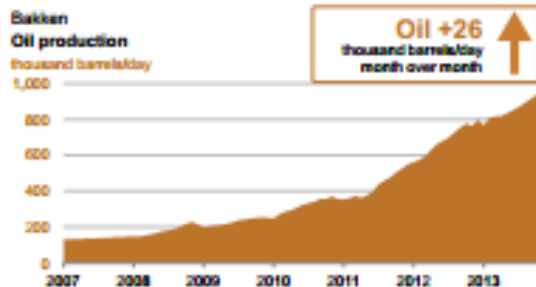
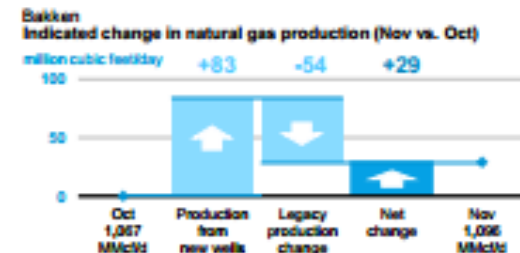
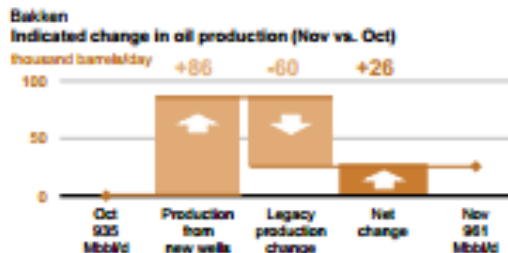
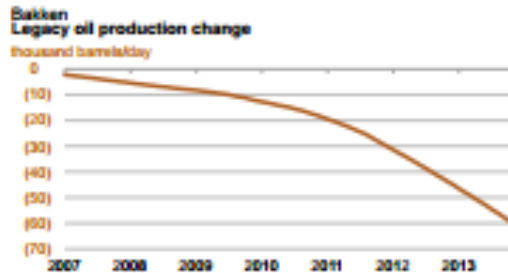
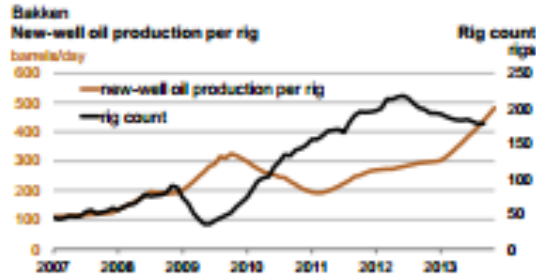
# Oil production has continued to rise in 2013 despite a leveling off of rig counts



Source: Baker Hughes, Inc. rig count, EIA Short-Term Energy Outlook

## EIA's Drilling Productivity Report (DPR) uses a series of new metrics to assess the production and depletion trends of oil and natural gas wells

- Rig count
- Well classification
- Drilling efficiency
- Productivity of new wells
- Production and depletion trends



DPR  
Bakken page

## Key insights on drilling productivity and production trends

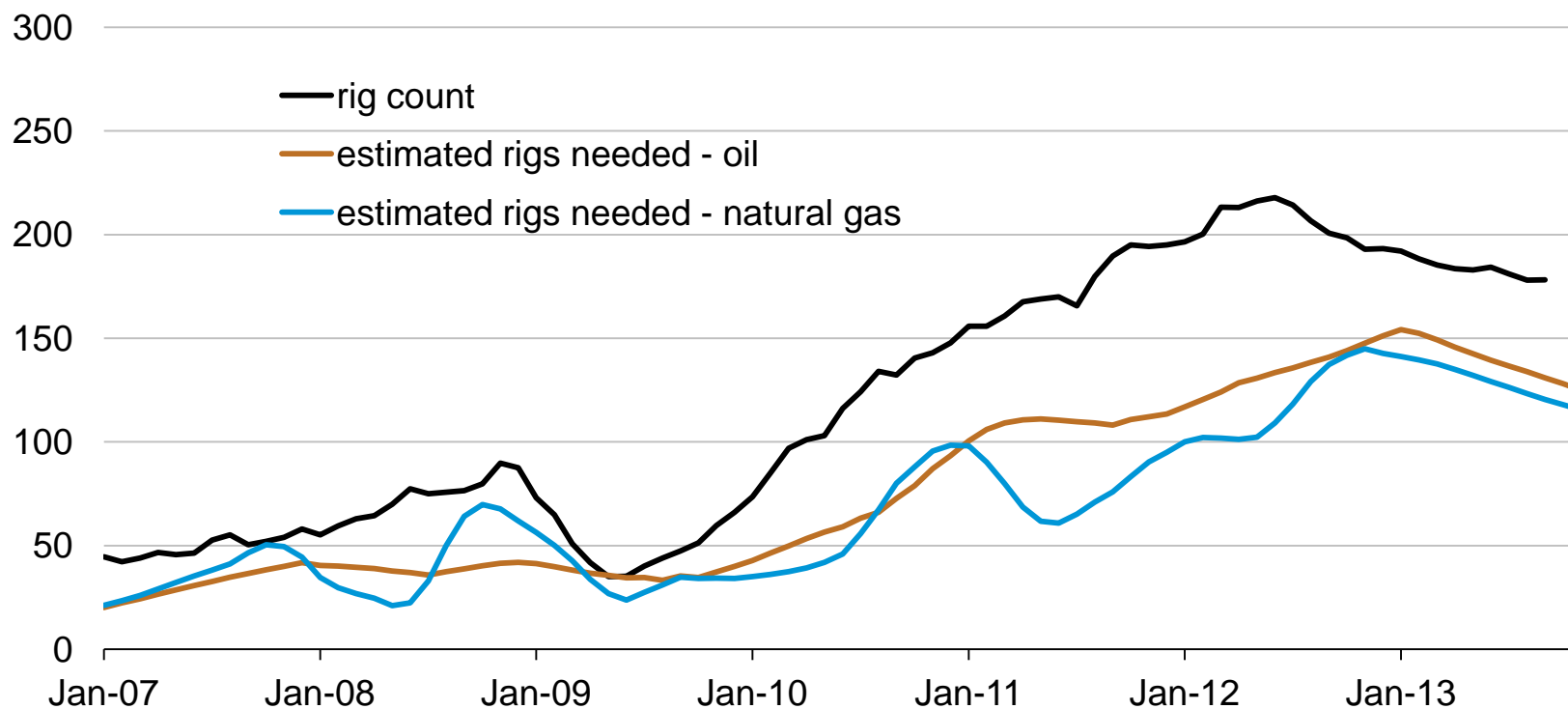
- Higher drilling efficiency and new well productivity, rather than an increase in the rig count, have been the main drivers of recent production growth
- In the six plays considered, steep legacy production decline rates offset new well production by 69% for oil and 73% for natural gas
- Understanding the positive and negative forces that affect production volumes in a given region allows the estimation of the number of rigs required to make up for the natural loss of production from existing wells
- Considering new and existing wells separately helps to highlight plays where the growing number of relatively new wells leads to large monthly declines in legacy production, putting more pressure on increasing production from new wells in order to keep net output rising



## Rigs needed to sustain production in the Bakken play

Bakken

rigs needed to sustain prior month's production

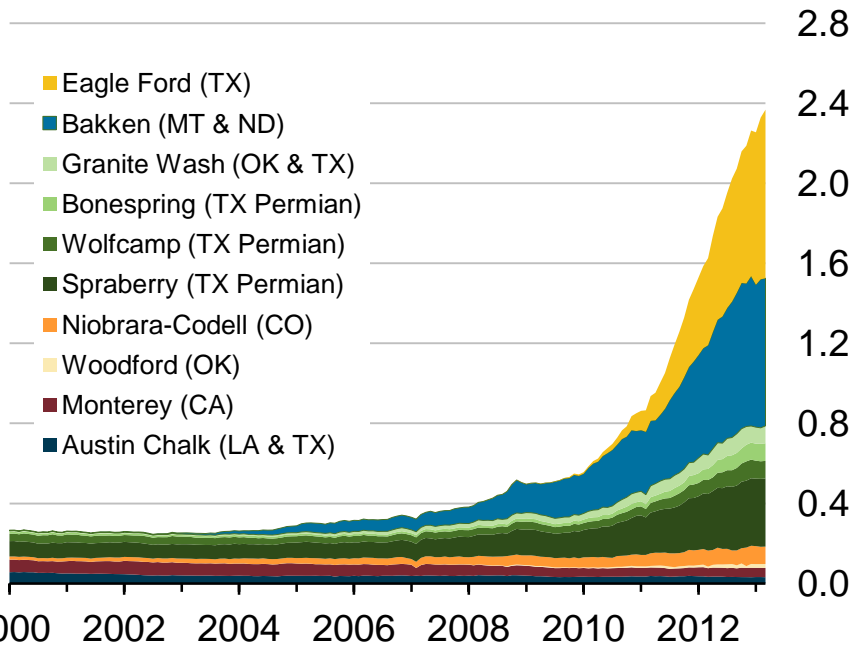


Source: EIA Drilling Productivity Report

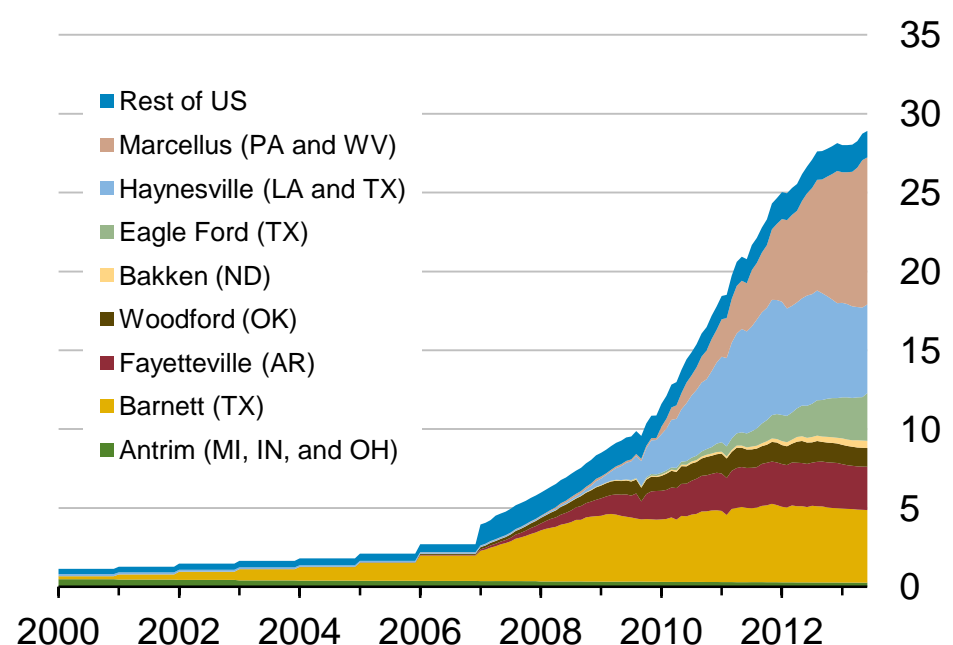
# Geopolitical implications of shale

# The U.S. has experienced a rapid increase in natural gas and oil production from shale and other tight resources

shale and tight oil production  
million barrels per day



dry shale gas production  
billion cubic feet per day



Note: Dry shale gas production data are based on LCI Energy Insight gross withdrawal estimates as of June 2013, converted to dry production estimates with EIA-calculated average gross-to-dry shrinkage factors by state and/or shale play.

Source: EIA based on DrillingInfo and LCI Energy Insight

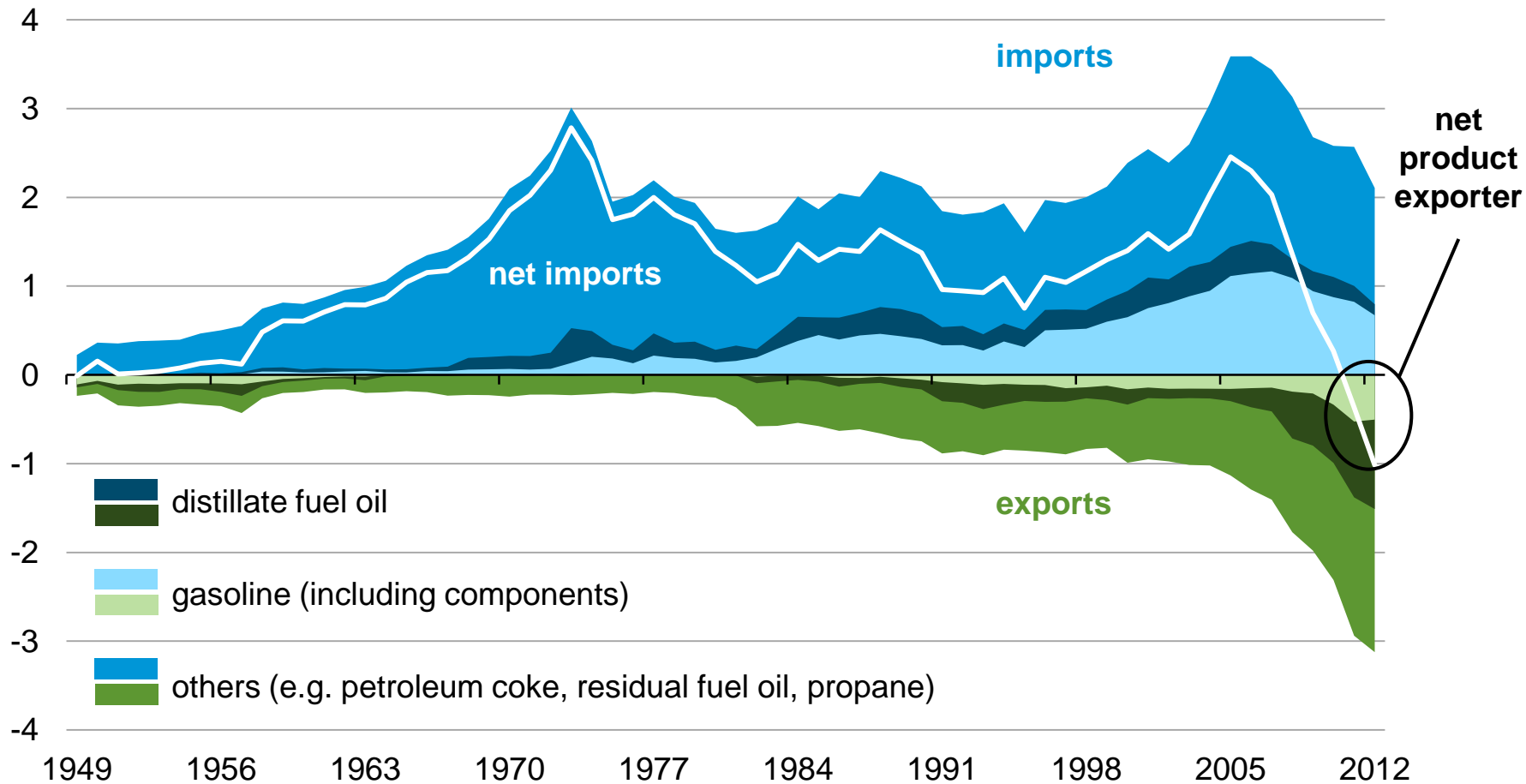
U.S. crude oil and natural gas production is up dramatically since 2010 and will continue to grow rapidly; this has strategic implications for the United States:

- Refinery operations/investment
- Logistics infrastructure investment
- Exports of petroleum products
- Exports of crude oil and natural gas (LNG)
- Management of Strategic Petroleum Reserve

# Domestic crude availability and low natural gas prices have supported product exports

annual U.S. net imports of total petroleum products, 1949 – 2012

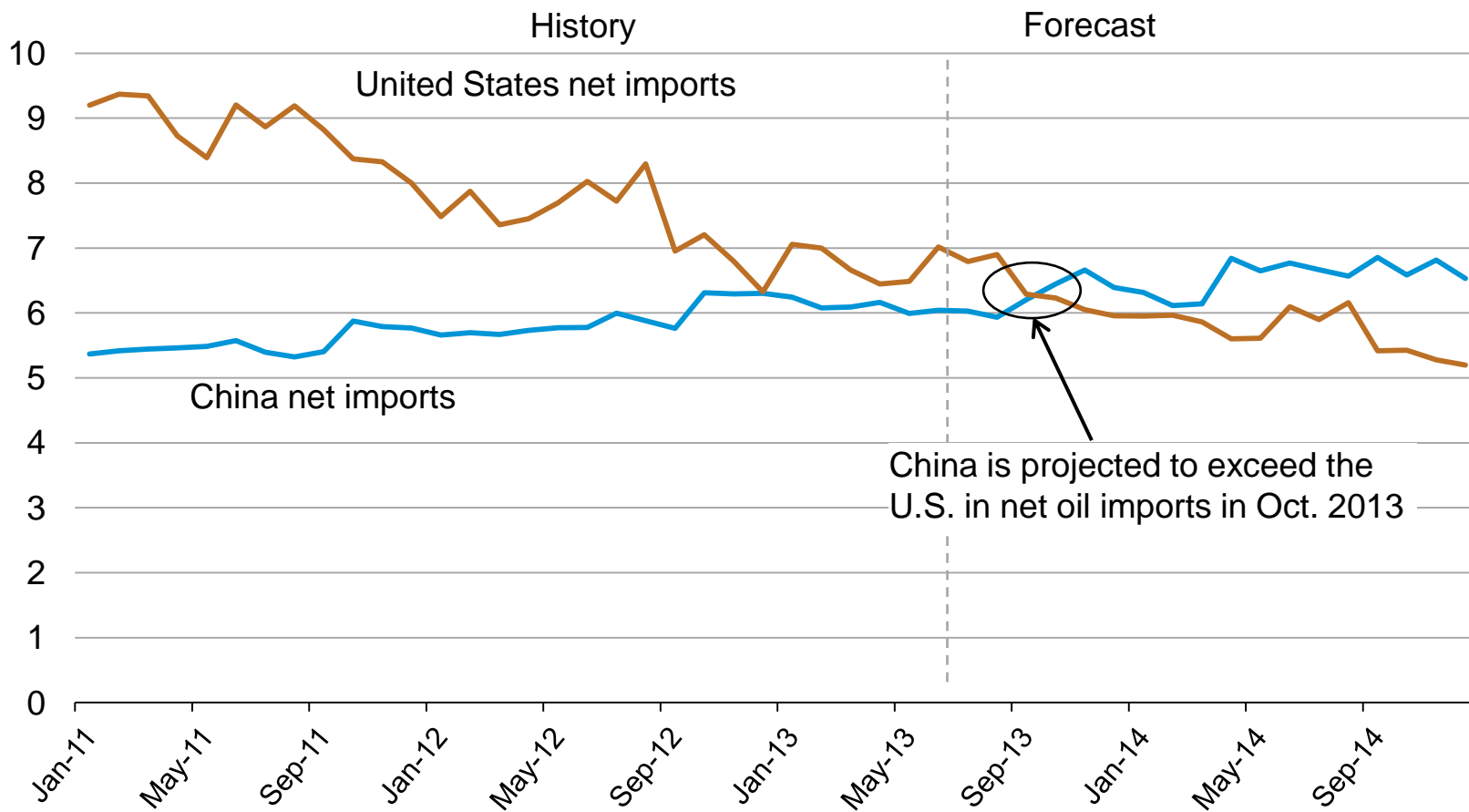
million barrels per day



Source: EIA, Petroleum Supply Monthly and Annual Energy Review

# China poised to become the world's largest net oil importer later this year

net imports for China and the United States  
millions of barrels per day



Note: Net oil imports are defined as total liquid fuels consumption less domestic production.

Source: EIA, Short-Term Energy Outlook, August 2013

## Top ten countries with technically recoverable shale resources

Shale oil		
Rank	Country	Billion barrels
1	Russia	75
2	United States	58
3	China	32
4	Argentina	27
5	Libya	26
6	Venezuela	13
7	Mexico	13
8	Pakistan	9
9	Canada	9
10	Indonesia	8
	<b>World total</b>	<b>345</b>

Shale gas		
Rank	Country	Trillion cubic feet
1	China	1,115
2	Argentina	802
3	Algeria	707
4	United States	665
5	Canada	573
6	Mexico	545
7	Australia	437
8	South Africa	390
9	Russia	285
10	Brazil	245
	<b>World total</b>	<b>7,299</b>

*Note: ARI estimates U.S. shale oil resources at 48 billion barrels and U.S. shale gas resources at 1,161 trillion cubic feet.  
Source: United States: EIA and USGS; Other basins: ARI*

## Reproducibility of shale development may have limits

Many factors support production from U.S. shale resources that do not exist in many other countries:

- Resource quality and geologic distribution details matter
- Major private ownership of subsurface mineral rights, often by surface owners, provides a strong incentive for development
- Availability of many independent operators and supporting contractors with critical expertise and advanced technology
- Pre-existing gathering and pipeline infrastructure
- Public acceptance of hydraulic fracturing as well as related activities, including transportation of material, and availability and disposal of water/wastewater; population density



## Geopolitical implications of shale resources

- Shale oil is both light and sweet — the rapid growth in its supply has implications for crude oil pricing relationships, the value of different refinery configurations, refinery output slates, and the correspondence between SPR holdings and U.S. crude imports
- China's success in shale development and its future LNG imports (and coal use) are inversely related
- Russia's share of Europe's gas market could be reduced by increased European shale production
- High volumes of shale oil production, with other drivers, could significantly diminish the market share and pricing power of key OPEC producers
- Shorter lead times for the 'manufacturing' model of production from shale resources may reduce price volatility (over an extended period) compared to the historical 'exploration/development' model for conventional resources

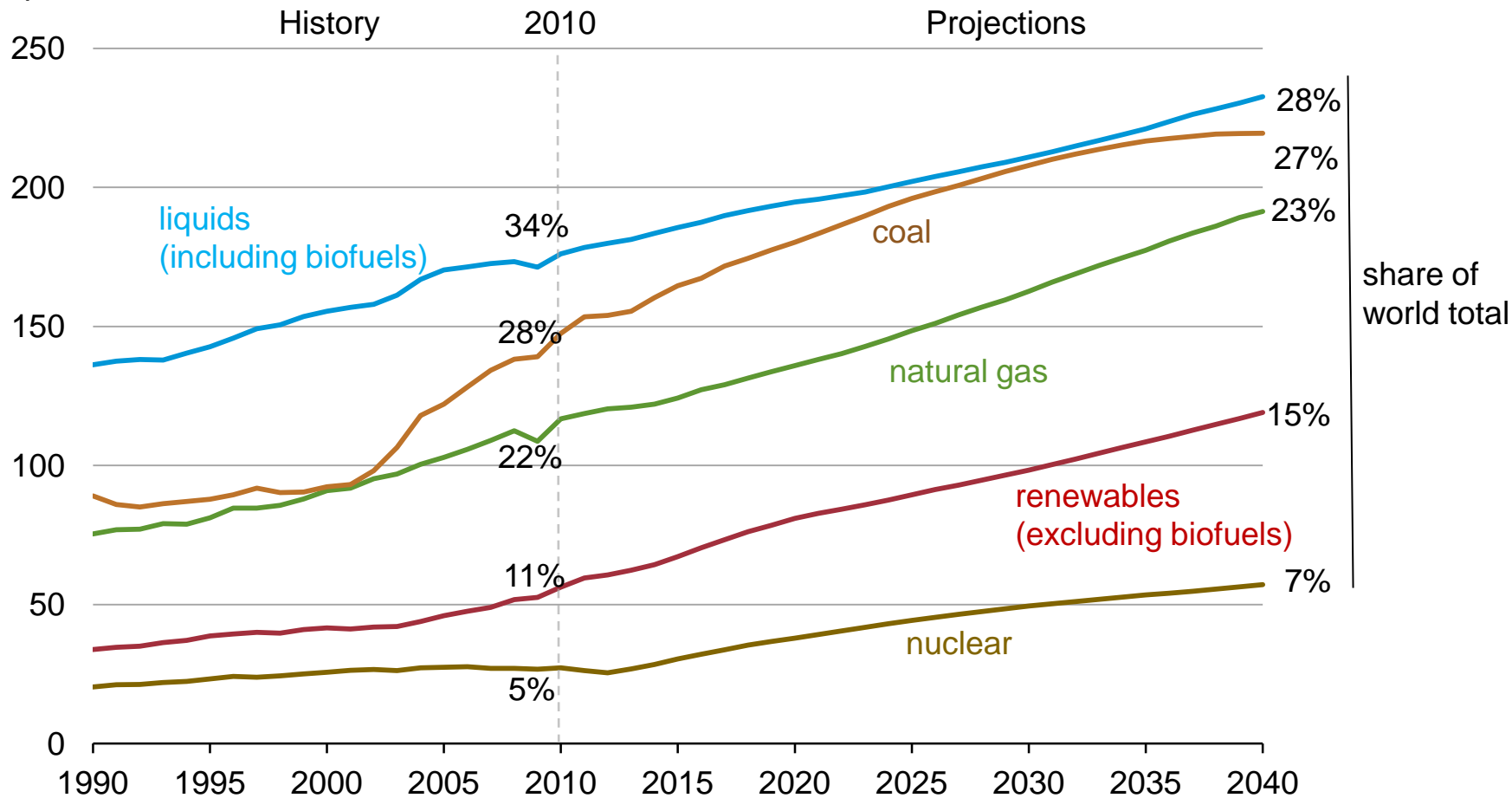
# EIA International Energy Outlook

## Key findings of the EIA's International Energy Outlook 2013

- With world GDP rising by 3.6 percent per year, world energy use will grow by 56 percent between 2010 and 2040; half of the increase is attributed to China and India
- Renewable energy and nuclear power are the world's fastest-growing energy sources, each increasing by 2.5 percent per year; however, fossil fuels continue to supply almost 80 percent of world energy use through 2040
- Natural gas is the fastest growing fossil fuel in the outlook, supported by increasing supplies of shale gas, particularly in the United States
- Coal grows faster than petroleum consumption until after 2030, mostly due to increases in China's consumption of coal, and slow growth in oil demand in OECD member countries
- Given current policies and regulations, worldwide energy-related carbon dioxide emissions are projected to increase 46 percent by 2040, reaching 45 billion metric tons in 2040

# Renewable energy and nuclear power are the fastest growing source of energy consumption out to 2040

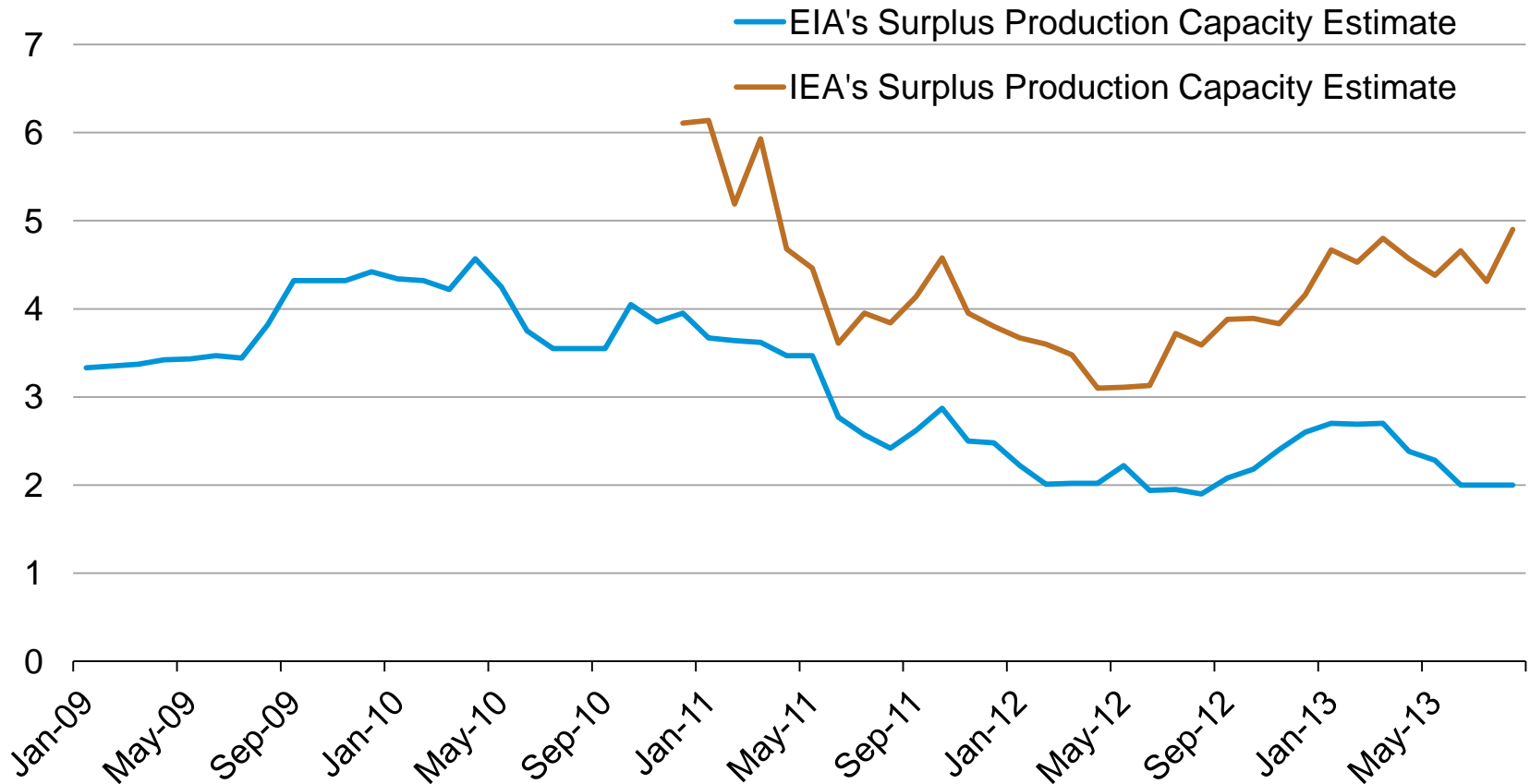
world energy consumption by fuel  
quadrillion Btu



Source: EIA, International Energy Outlook 2013

# OPEC crude oil disruptions have reduced global surplus oil production capacity

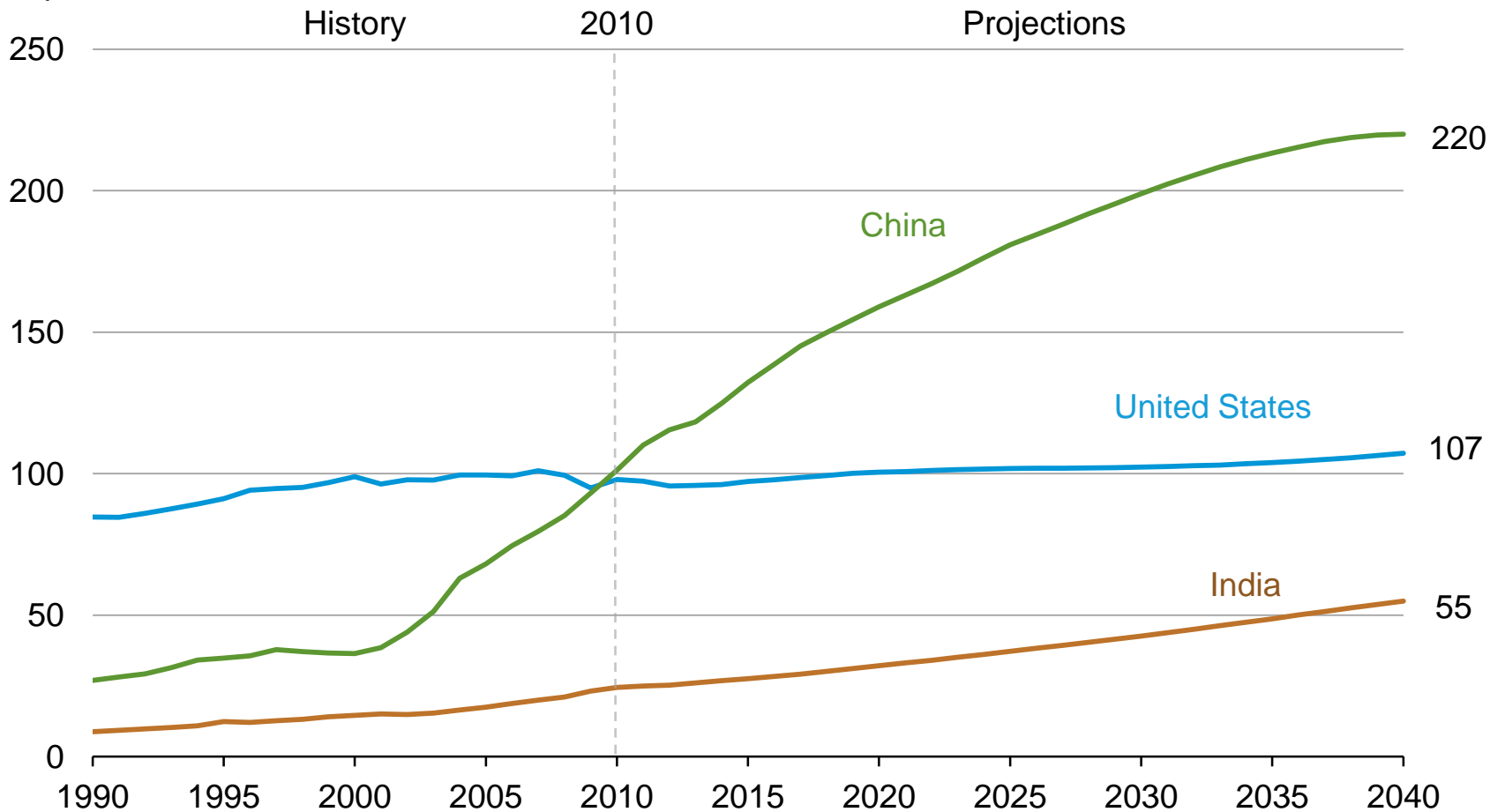
surplus oil production capacity  
million barrels per day



Sources: EIA, Short-Term Energy Outlook, September 2013; Monthly Oil Market Report

# By 2040, China's energy use will be double the U.S. level; India's a little more than half despite its faster GDP growth

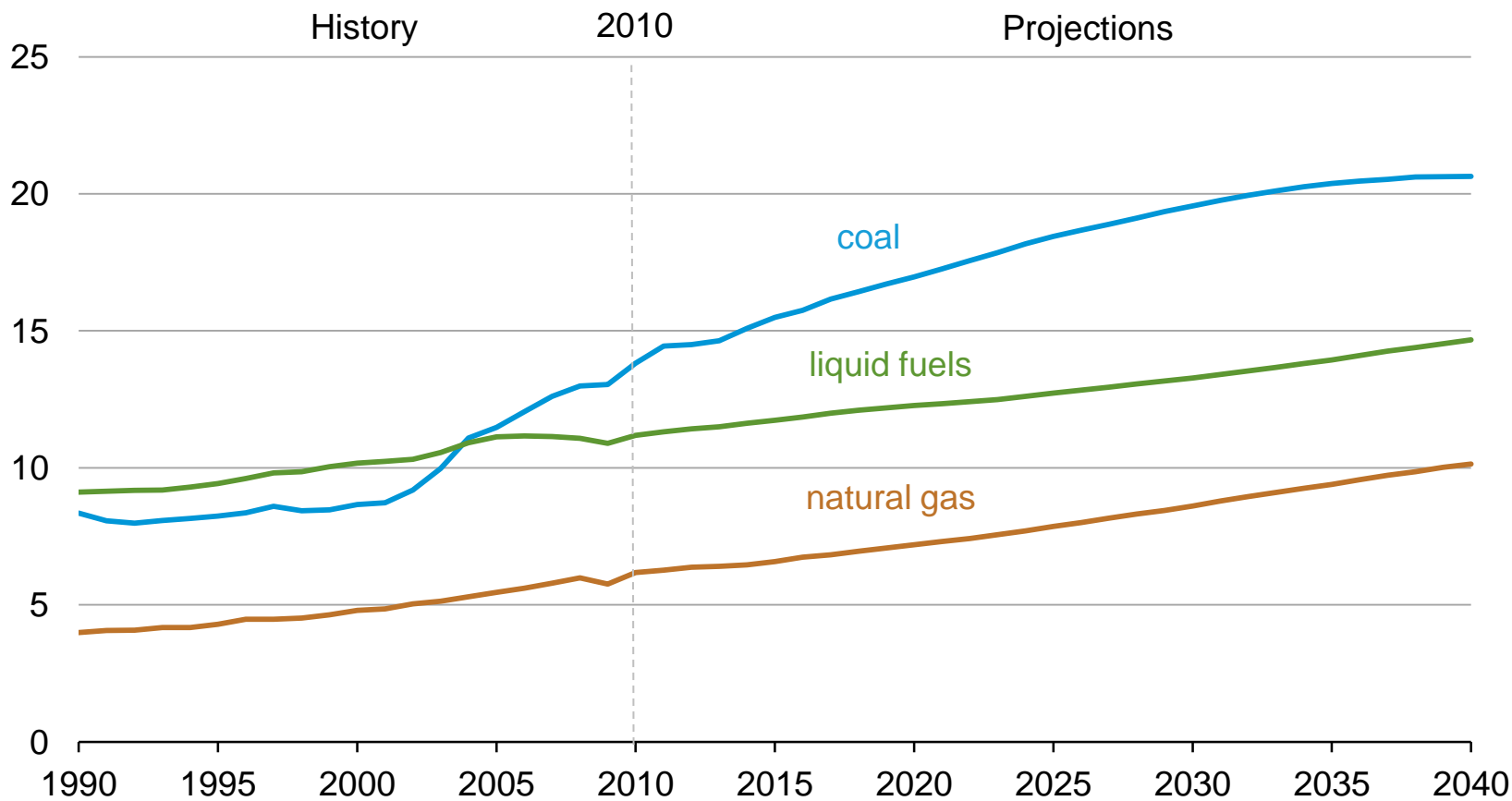
energy consumption by selected country  
quadrillion Btu



Source: EIA, International Energy Outlook 2013

# World energy-related carbon dioxide emissions by fuel type, 1990-2040

carbon dioxide emissions  
billion metric tons



Source: EIA, International Energy Outlook 2013

## There are many issues that increase uncertainty...

- Unresolved long-term effects of economic issues in the United States, Europe, and China
- The timing of Japan's full recovery from the impacts of the 2011 nuclear disaster at Fukushima
- Social unrest in the Middle East and North Africa, and the potential for unrest elsewhere
- Shale gas and shale oil production potential
- OPEC market share decisions
- Climate policies



## For more information

U.S. Energy Information Administration home page | [www.eia.gov](http://www.eia.gov)

Short-Term Energy Outlook | [www.eia.gov/steo](http://www.eia.gov/steo)

Drilling Productivity Report | <http://www.eia.gov/petroleum/drilling>

International Energy Outlook | [www.eia.gov/ieo](http://www.eia.gov/ieo)

Annual Energy Outlook | [www.eia.gov/aeo](http://www.eia.gov/aeo)

Monthly Energy Review | [www.eia.gov/mer](http://www.eia.gov/mer)

Today in Energy | [www.eia.gov/todayinenergy](http://www.eia.gov/todayinenergy)

State Energy Portal | <http://www.eia.gov/state>