



Fueling Up

The Economic and Environmental Implications
of the American Oil & Gas Boom

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Partner, Rhodium Group

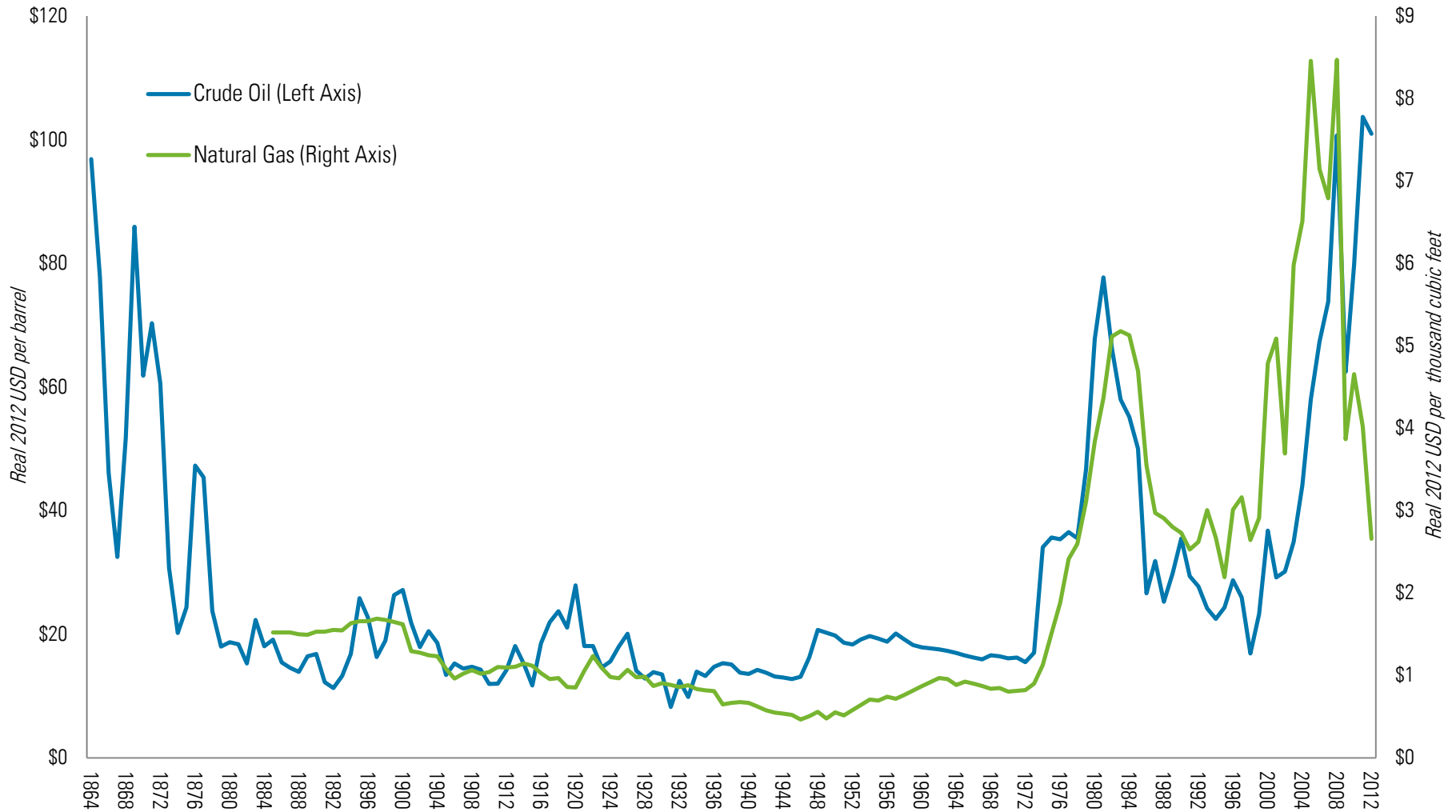
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The Dark Before the Dawn

Oil and natural gas prices

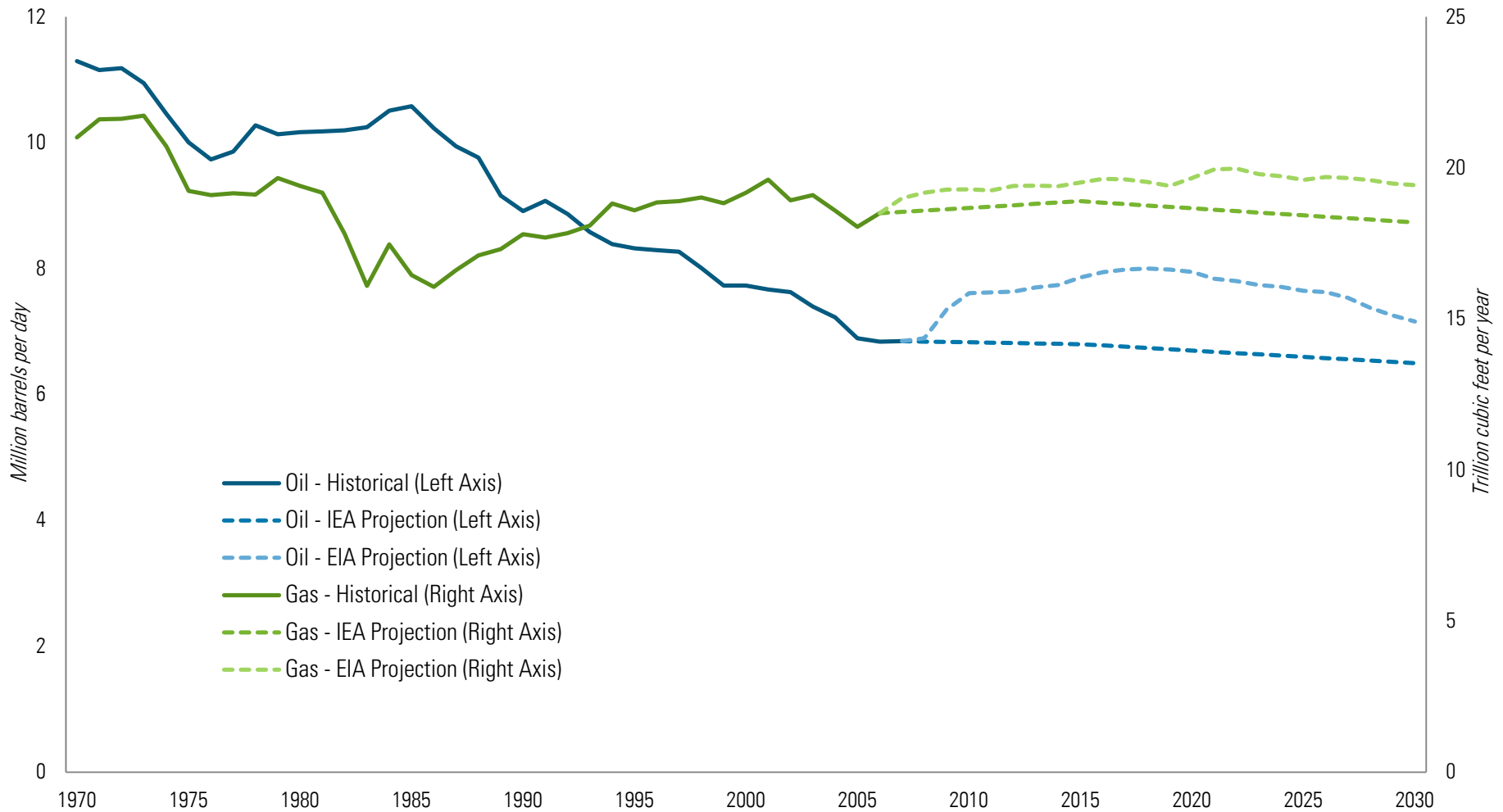
Real 2012 USD



Source: EIA, BLS, HSUS

US oil and gas production forecasts, 2008

Global supply and price



Source: IEA

President Bush calls for an end to oil

2006 State of the Union Address

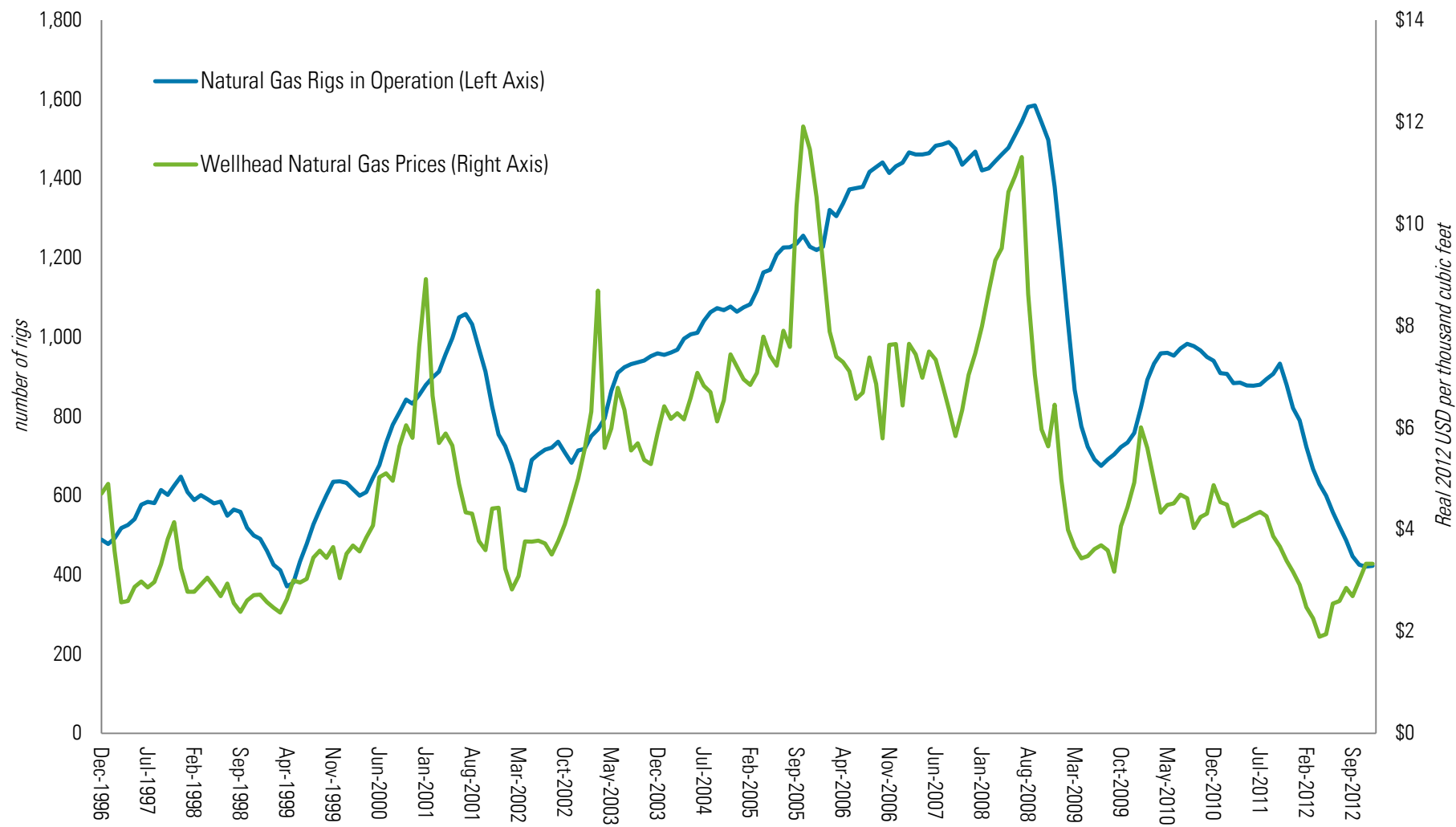
Keeping America competitive requires affordable energy. And here we have a serious problem: America is addicted to oil, which is often imported from unstable parts of the world.... By applying the talent and technology of America, this country can dramatically improve our environment, move beyond a petroleum-based economy, and make our dependence on Middle Eastern oil a thing of the past.

—President George W. Bush

An Oil & Gas Renaissance

High prices drive exploration

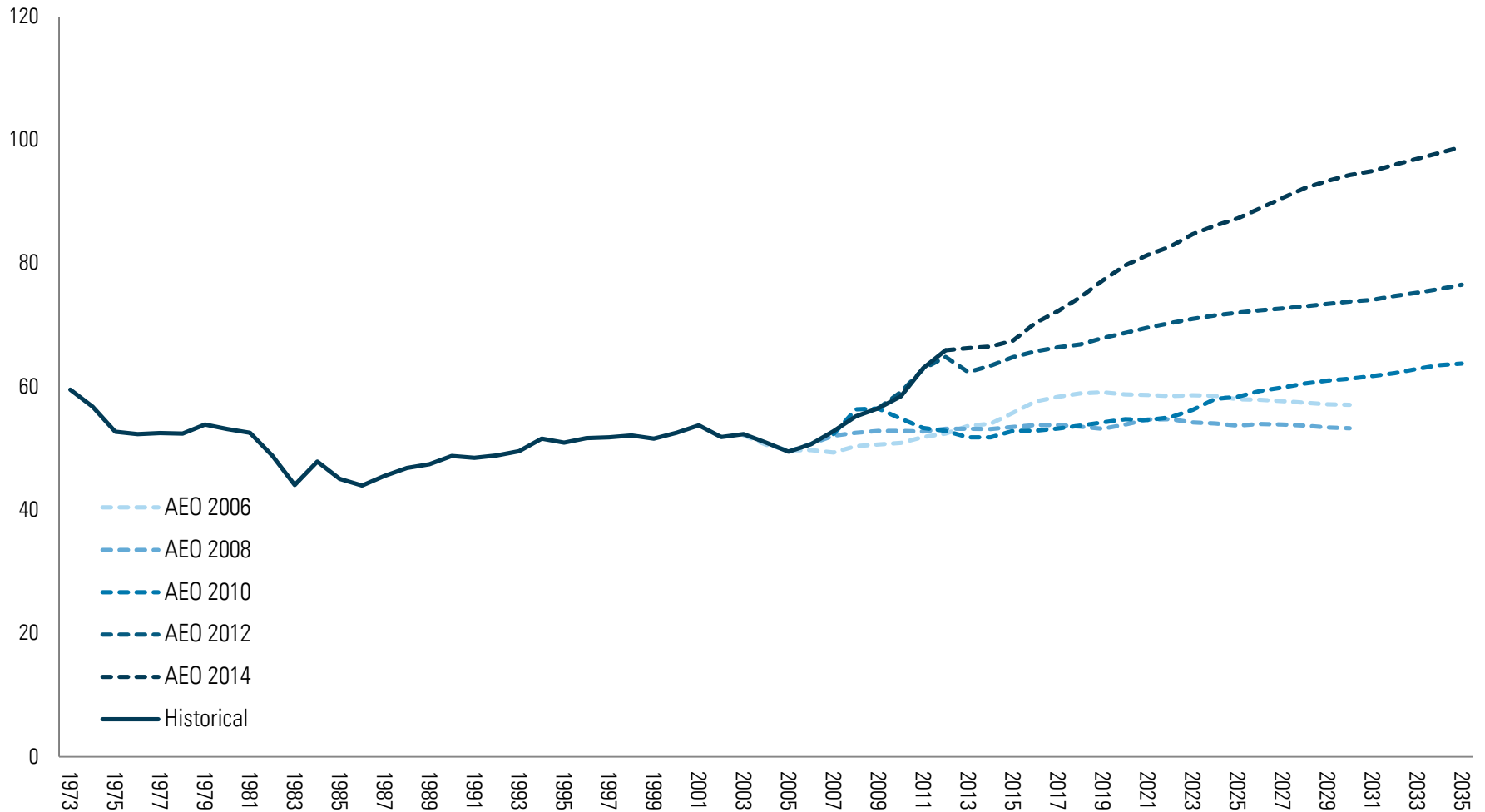
Natural gas rigs and prices



Source: EIA, Bloomberg

EIA natural gas production forecasts

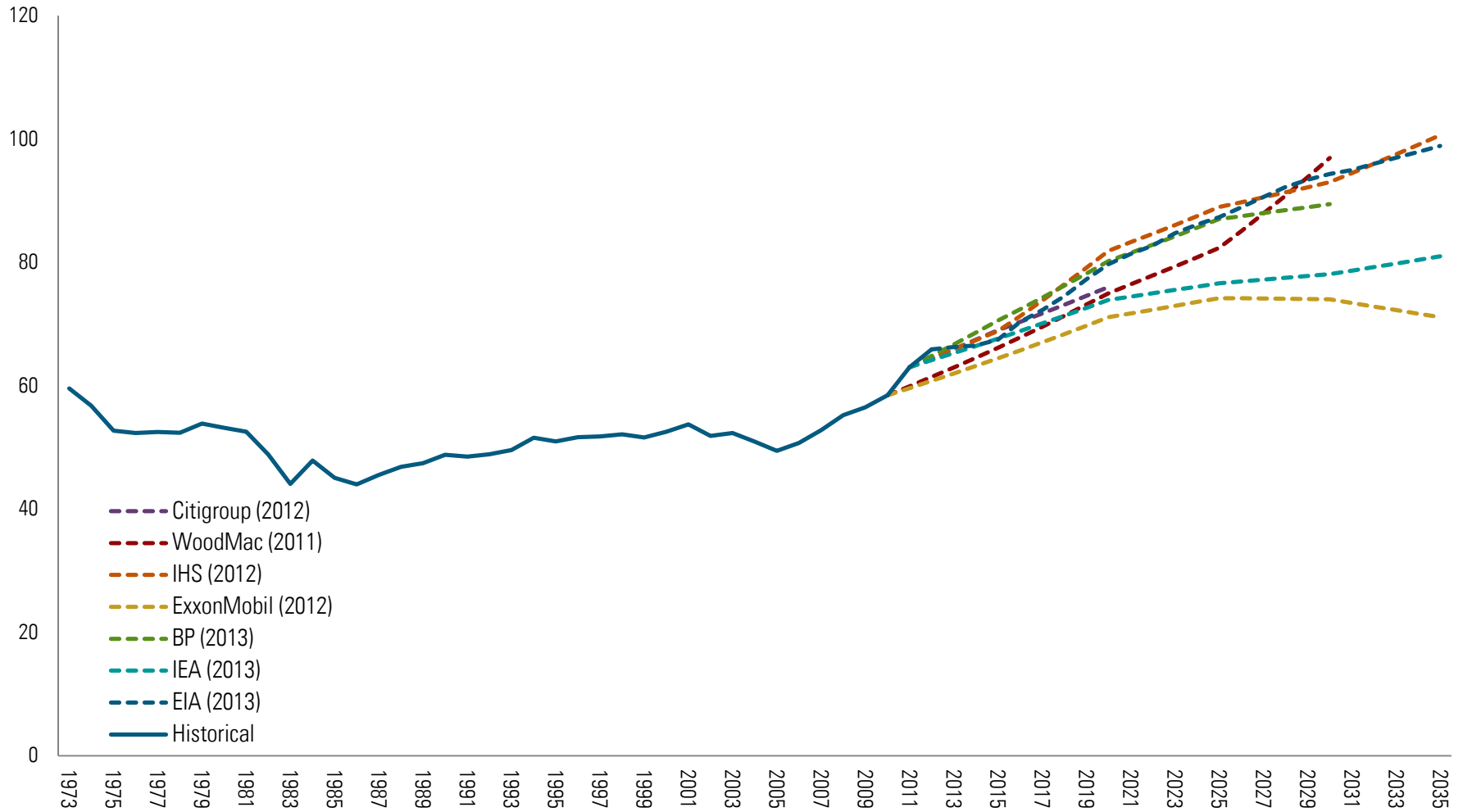
Billion cubic feet per day



Source: EIA

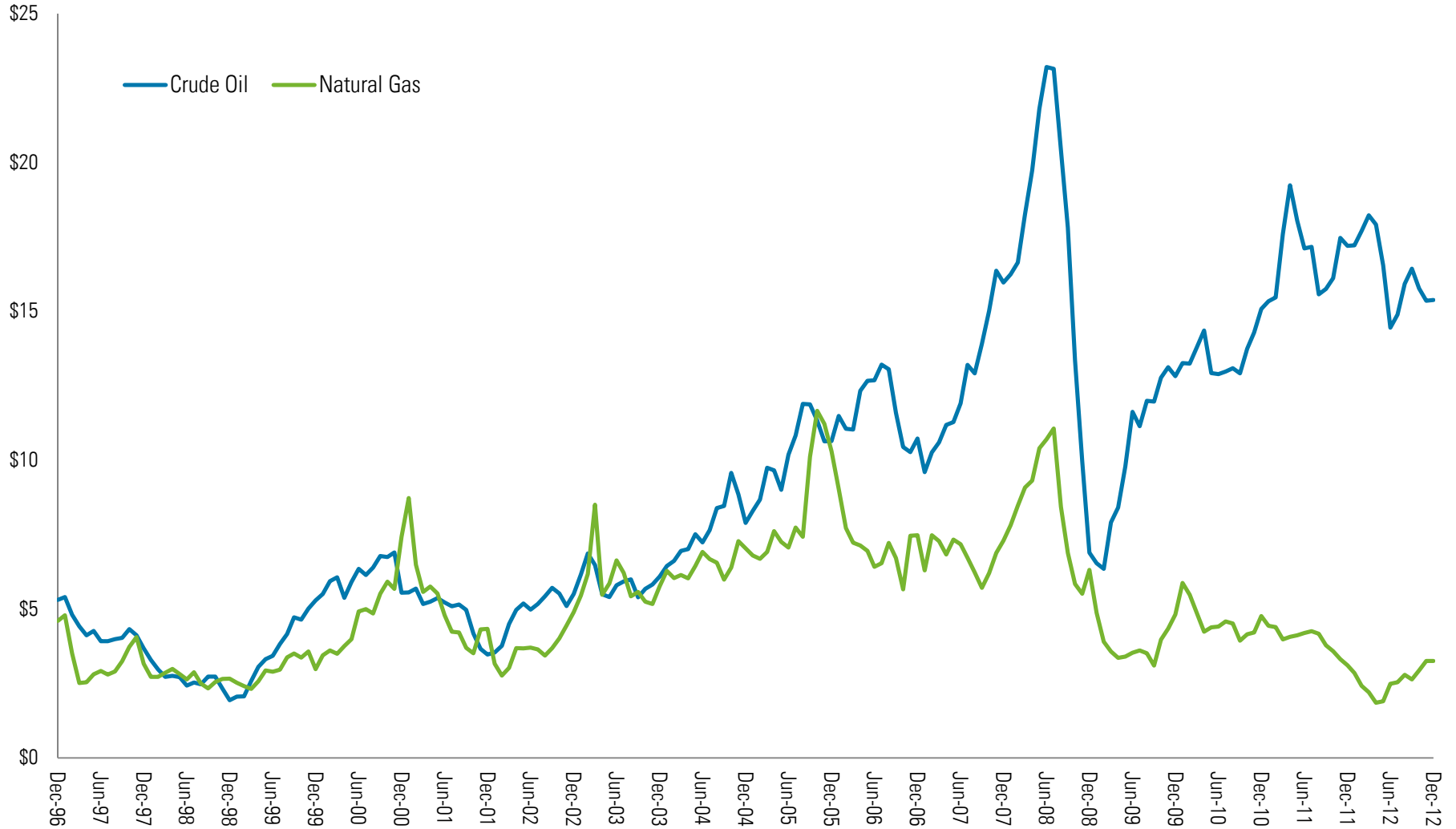
Recent natural gas production forecasts

Billion cubic feet per day



Oil and gas prices part ways

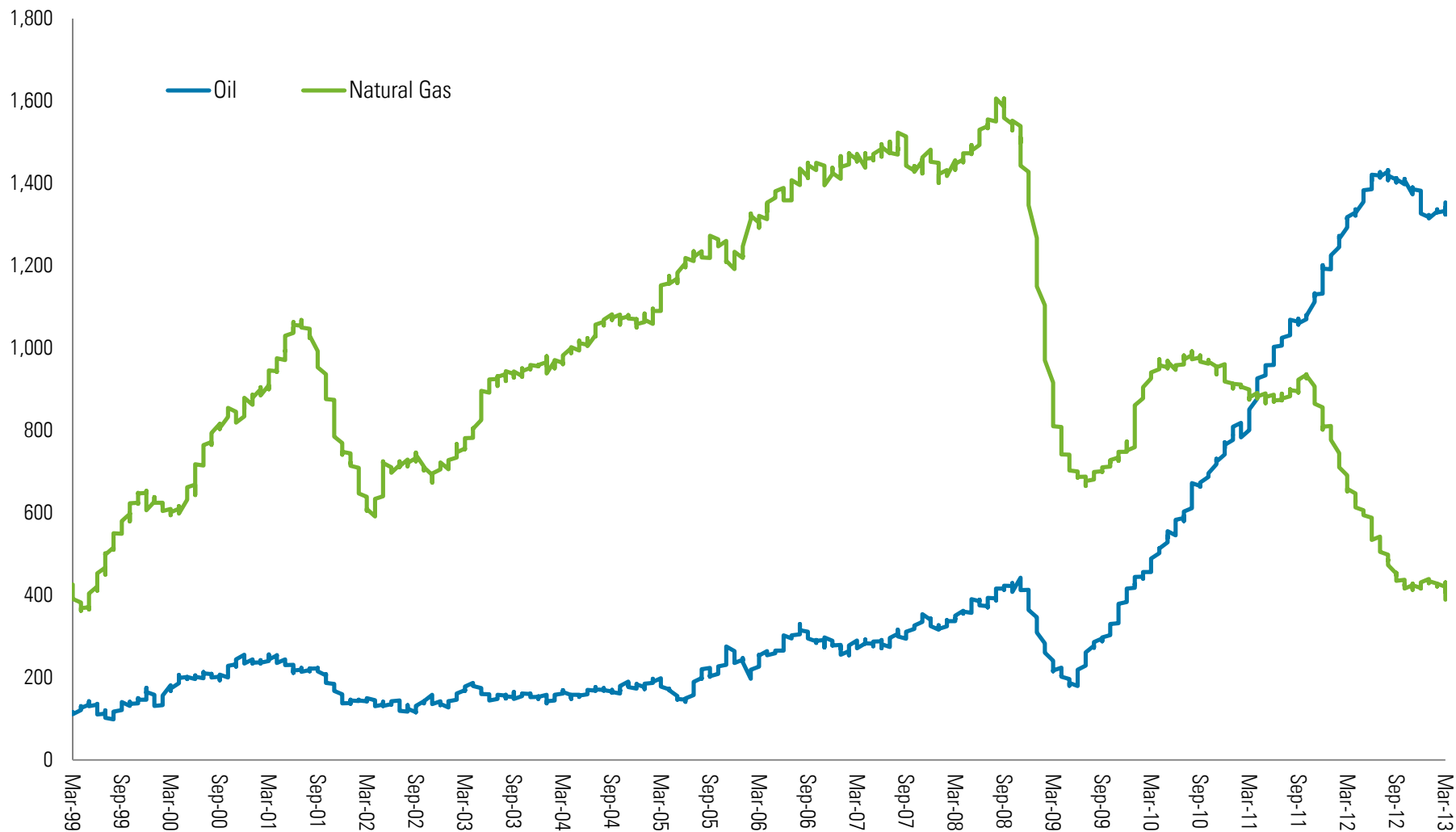
Real 2012 USD per MMBTU



Source: EIA, BLS

Turning the focus to oil

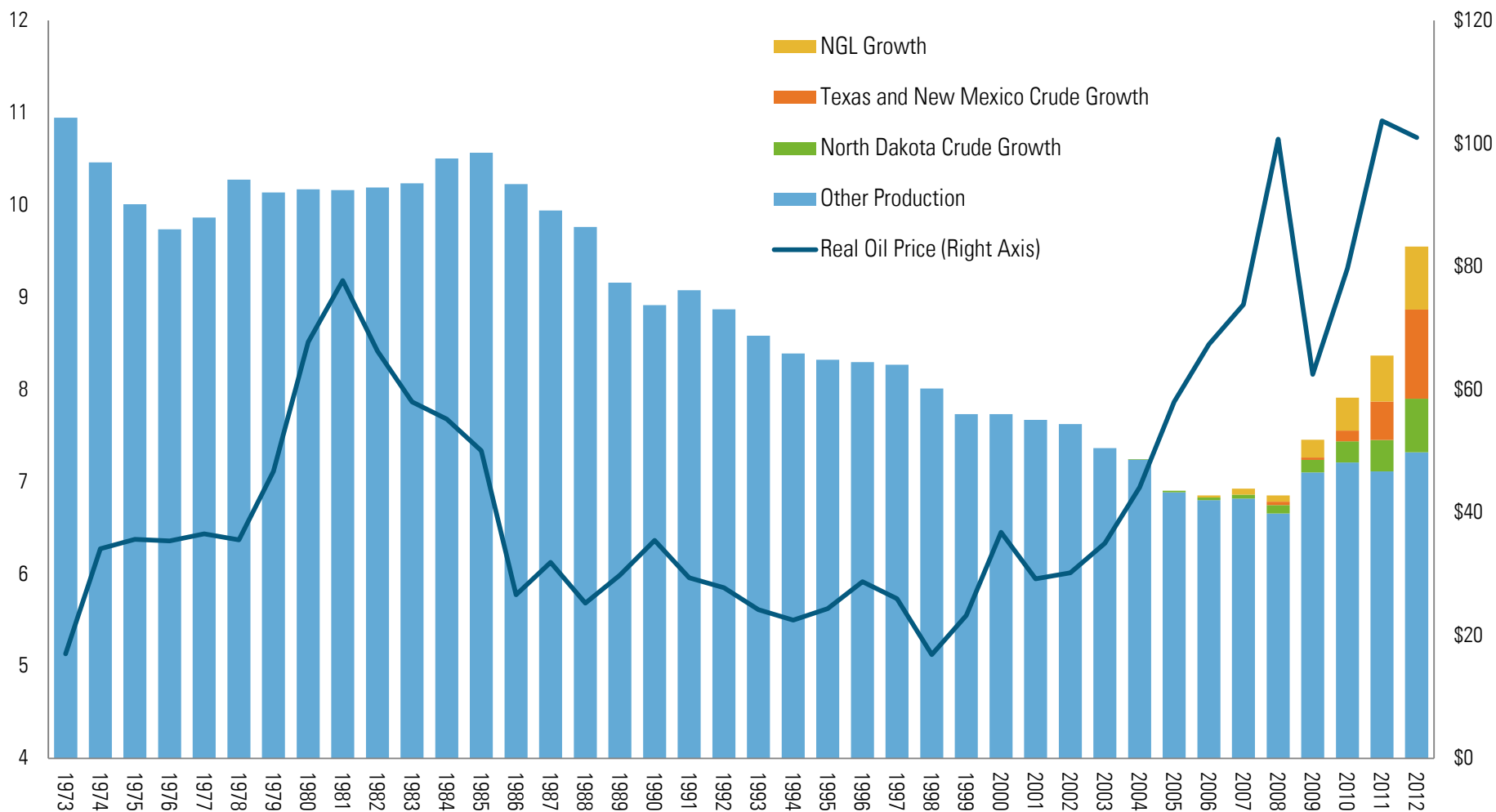
Number of active rigs



Source: Baker Hughes

A turnaround in US oil supply

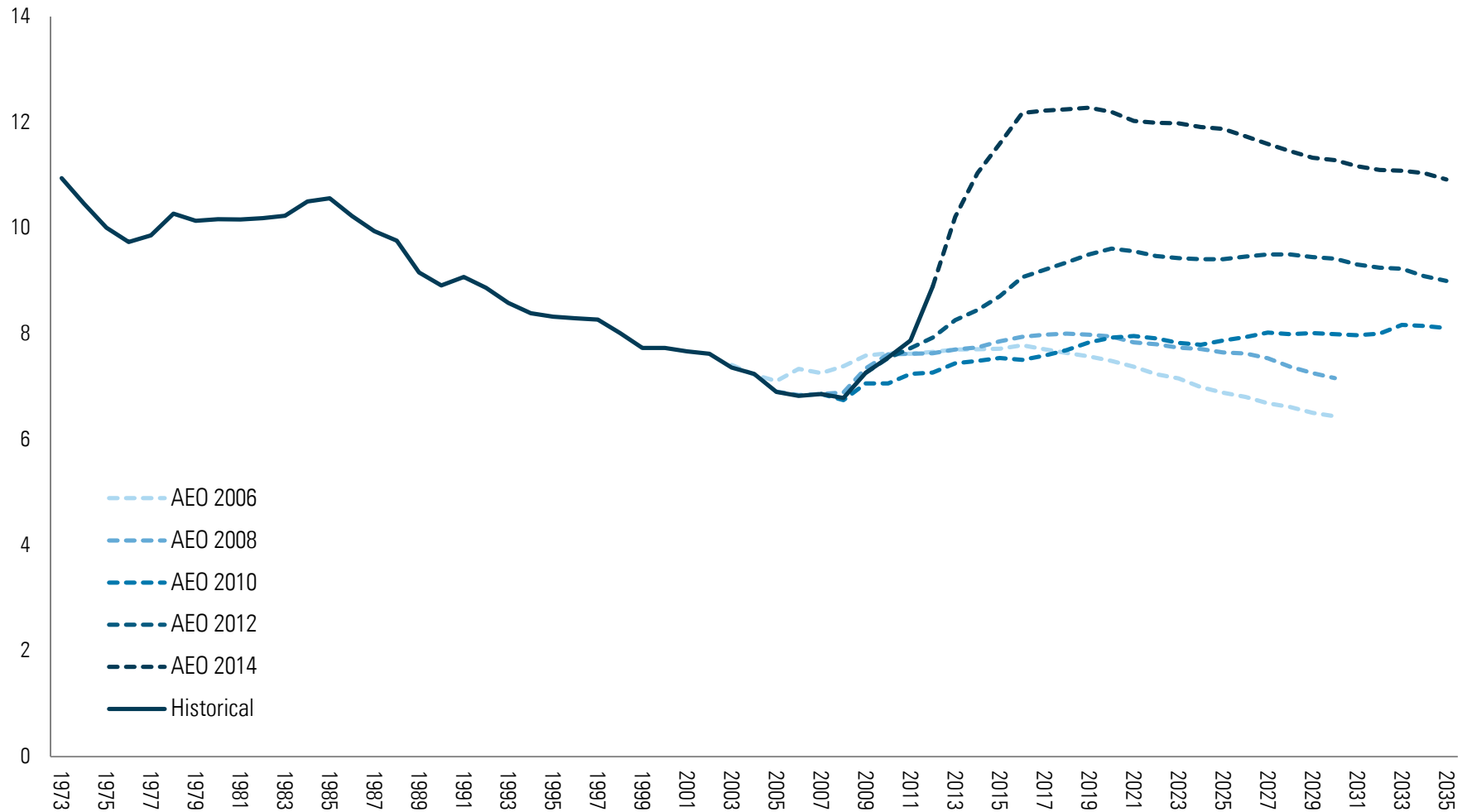
Million bbl/d of production



Source: EIA

EIA oil production forecasts

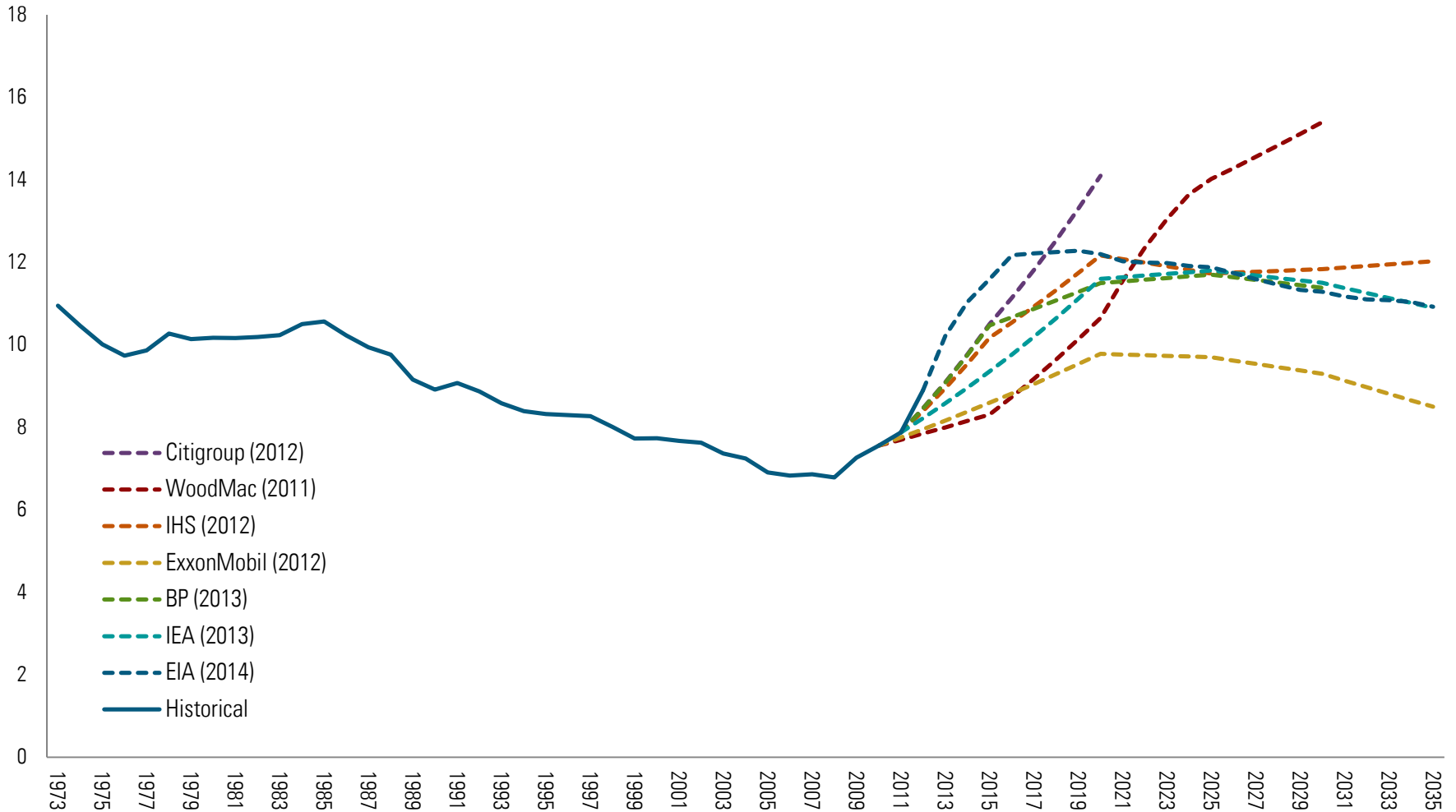
Million bbl/d



Source: EIA

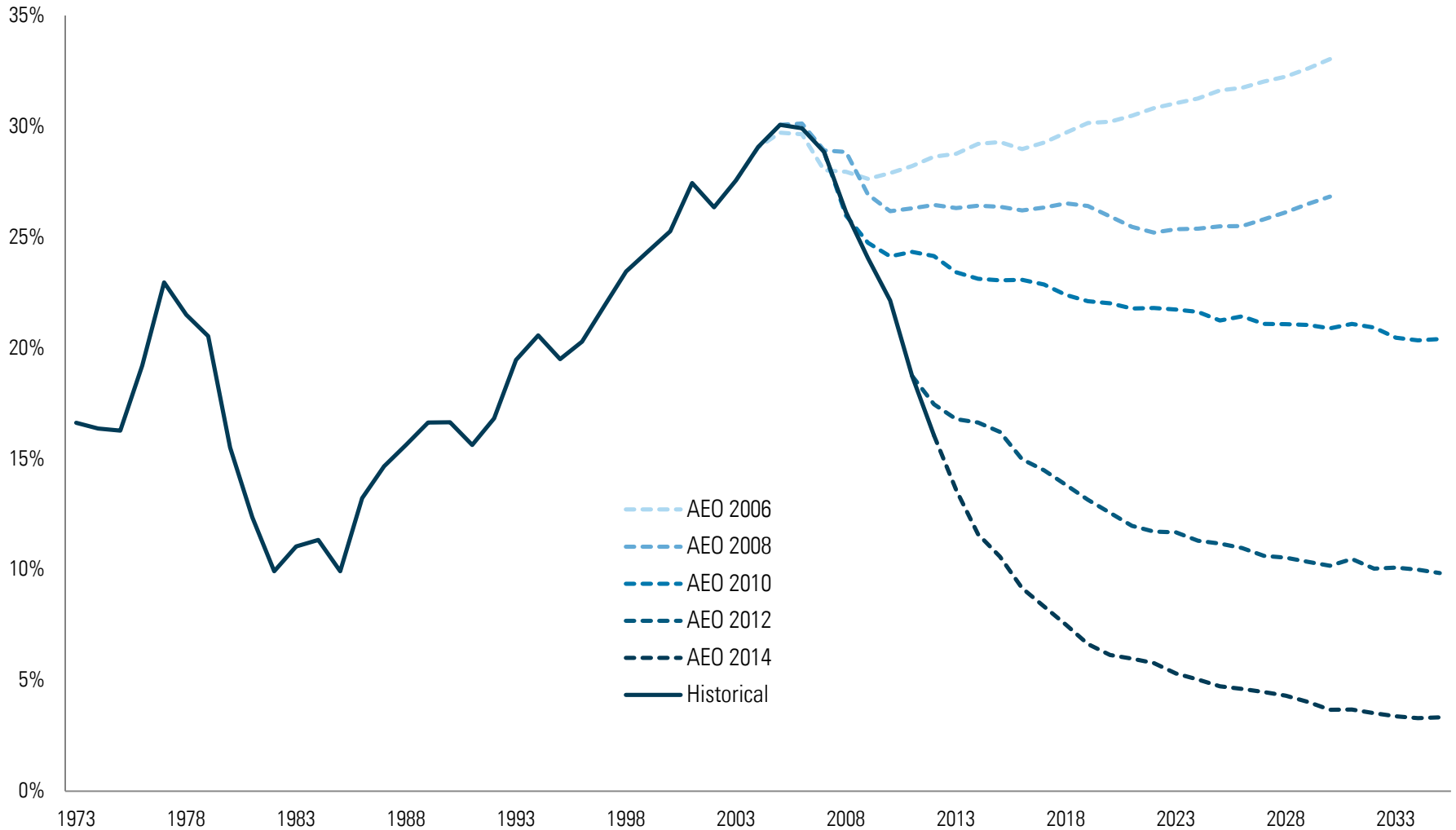
Recent oil production forecasts

Million bbl/d



Changing outlook for US dependence on imported energy

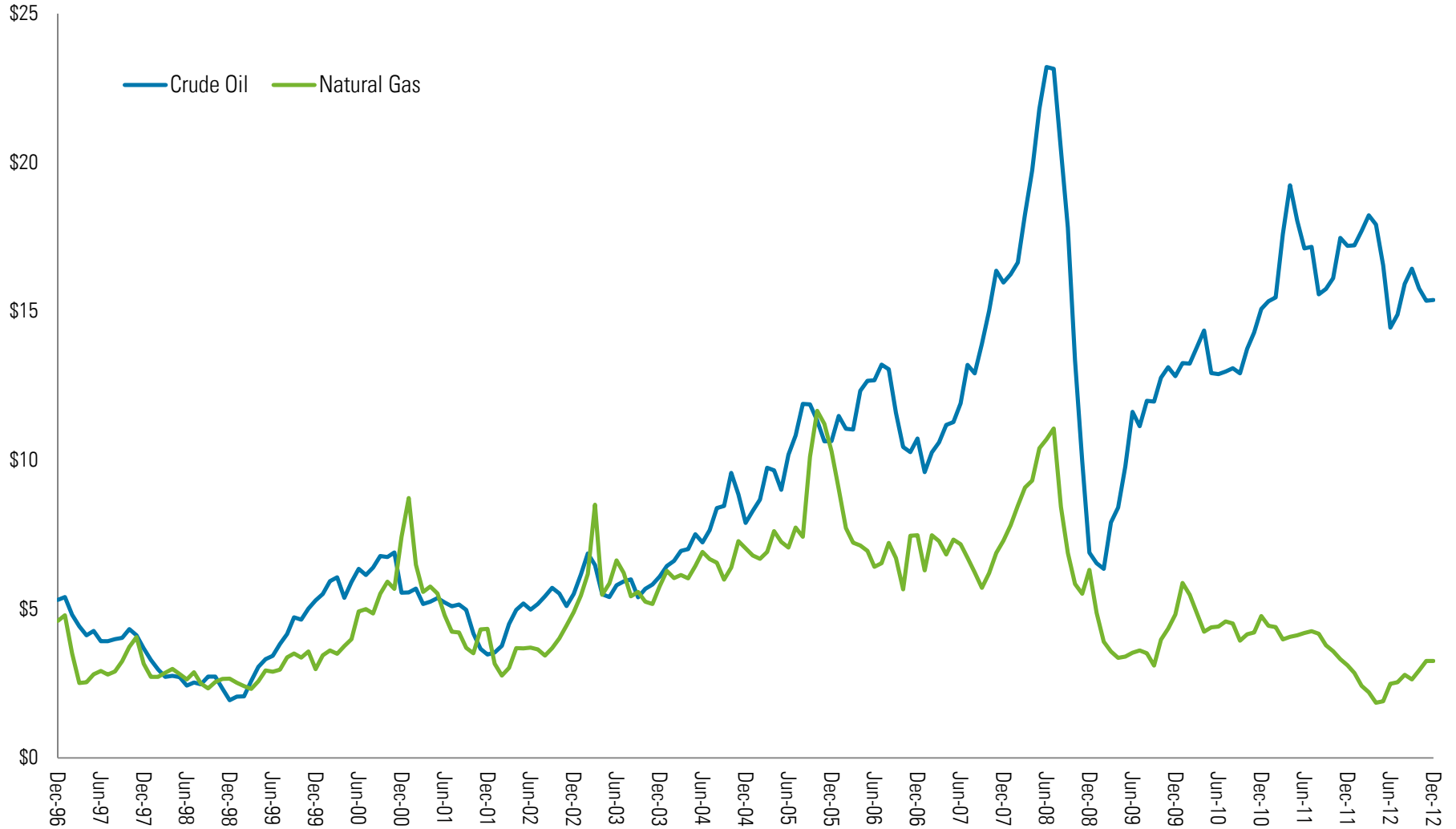
Share of total consumption



Source: EIA

Oil and gas prices part ways

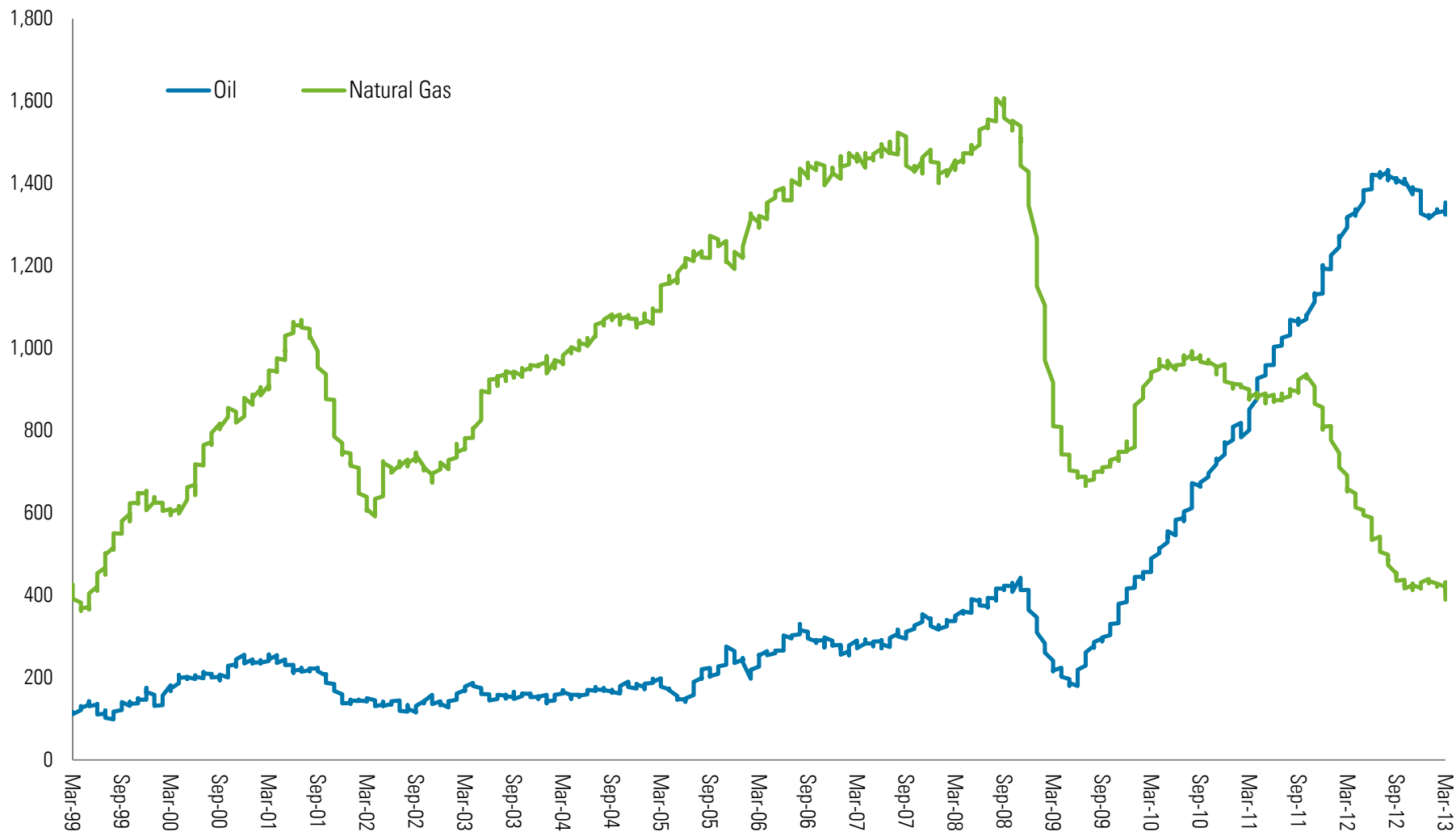
Real 2012 USD per MMBTU



Source: EIA, BLS

Turning the focus to oil

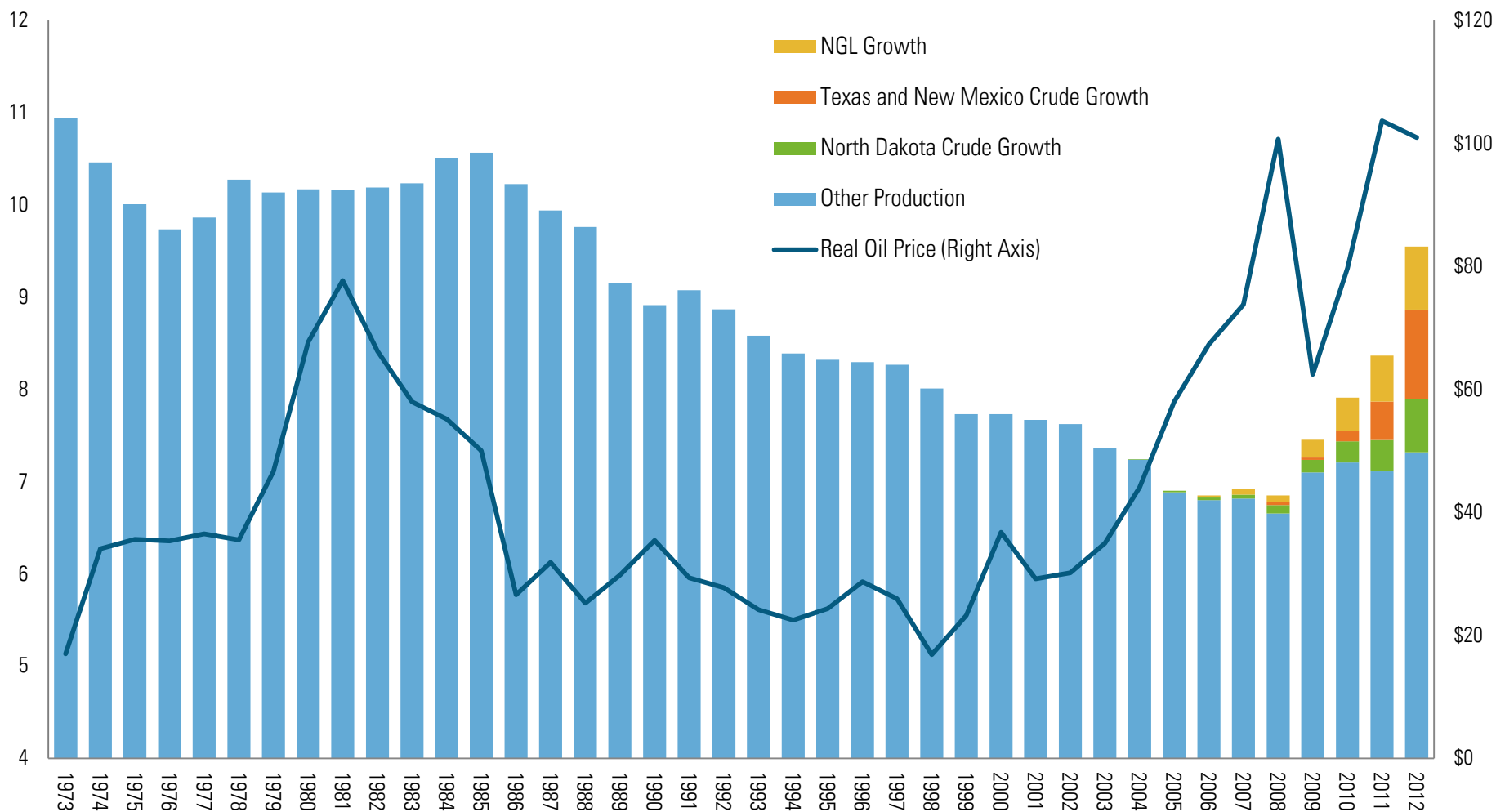
Number of active rigs



Source: Baker Hughes

A turnaround in US oil supply

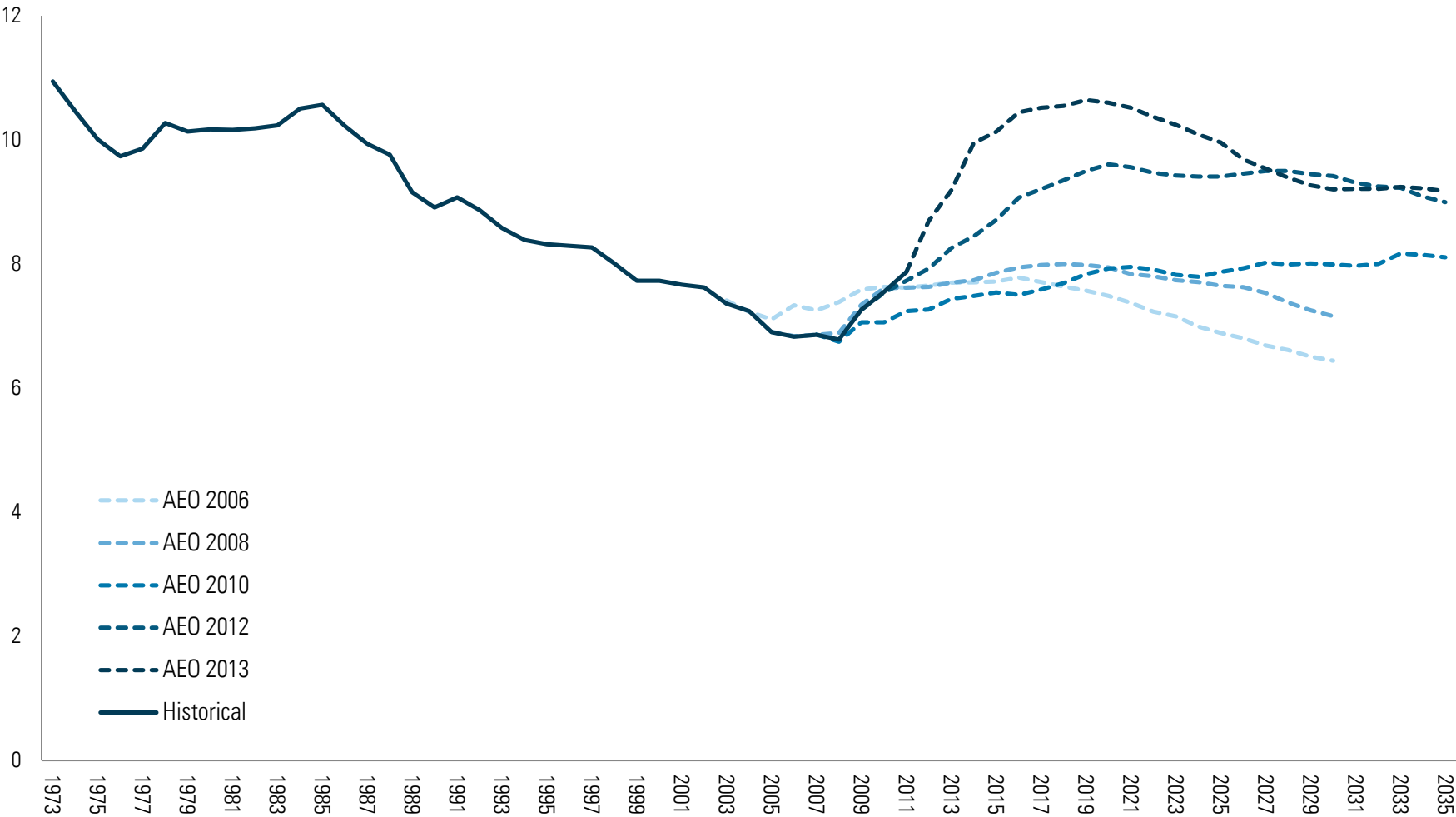
Million bbl/d of production



Source: EIA

And a revised oil supply outlook

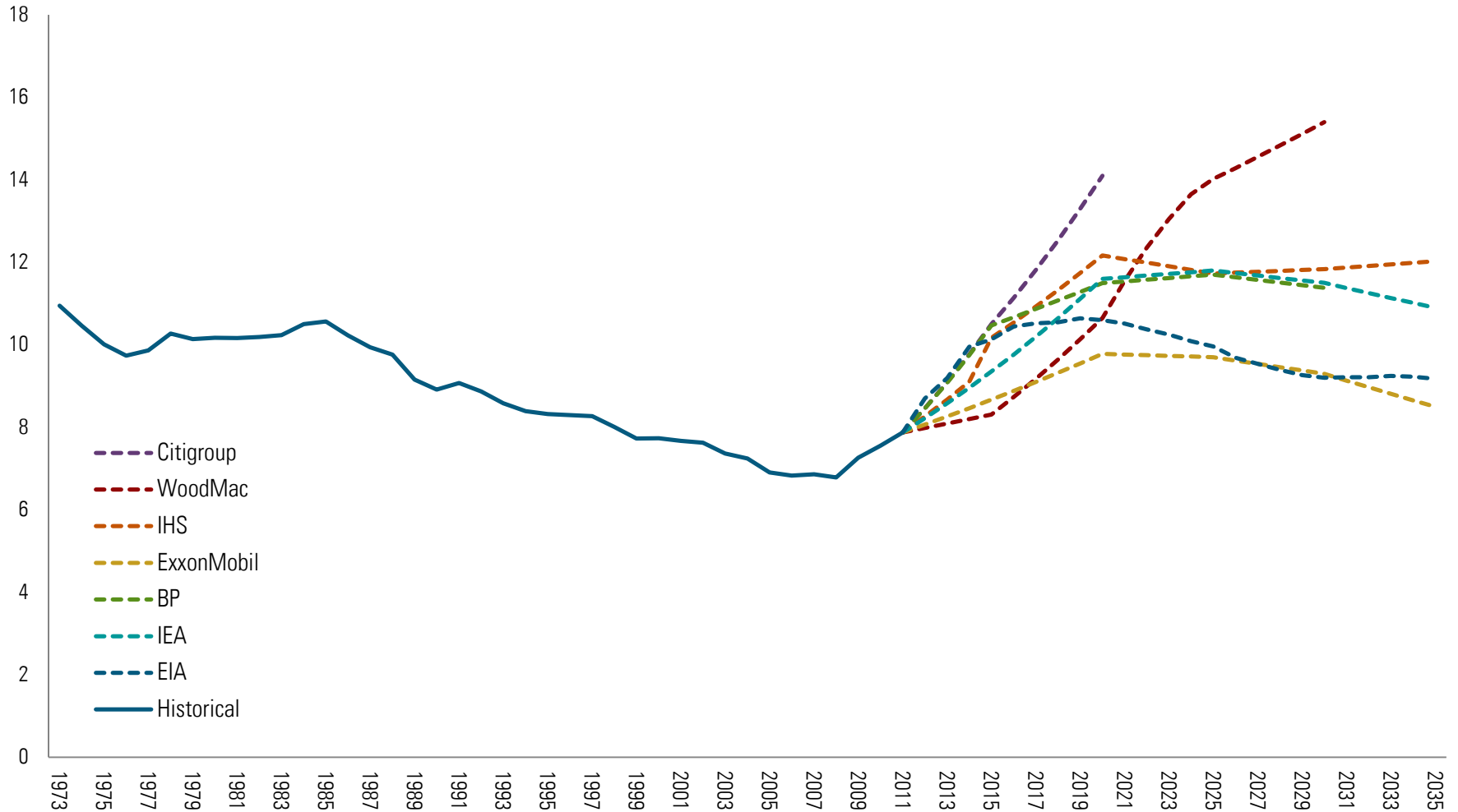
Million bbl/d of production



Source: EIA

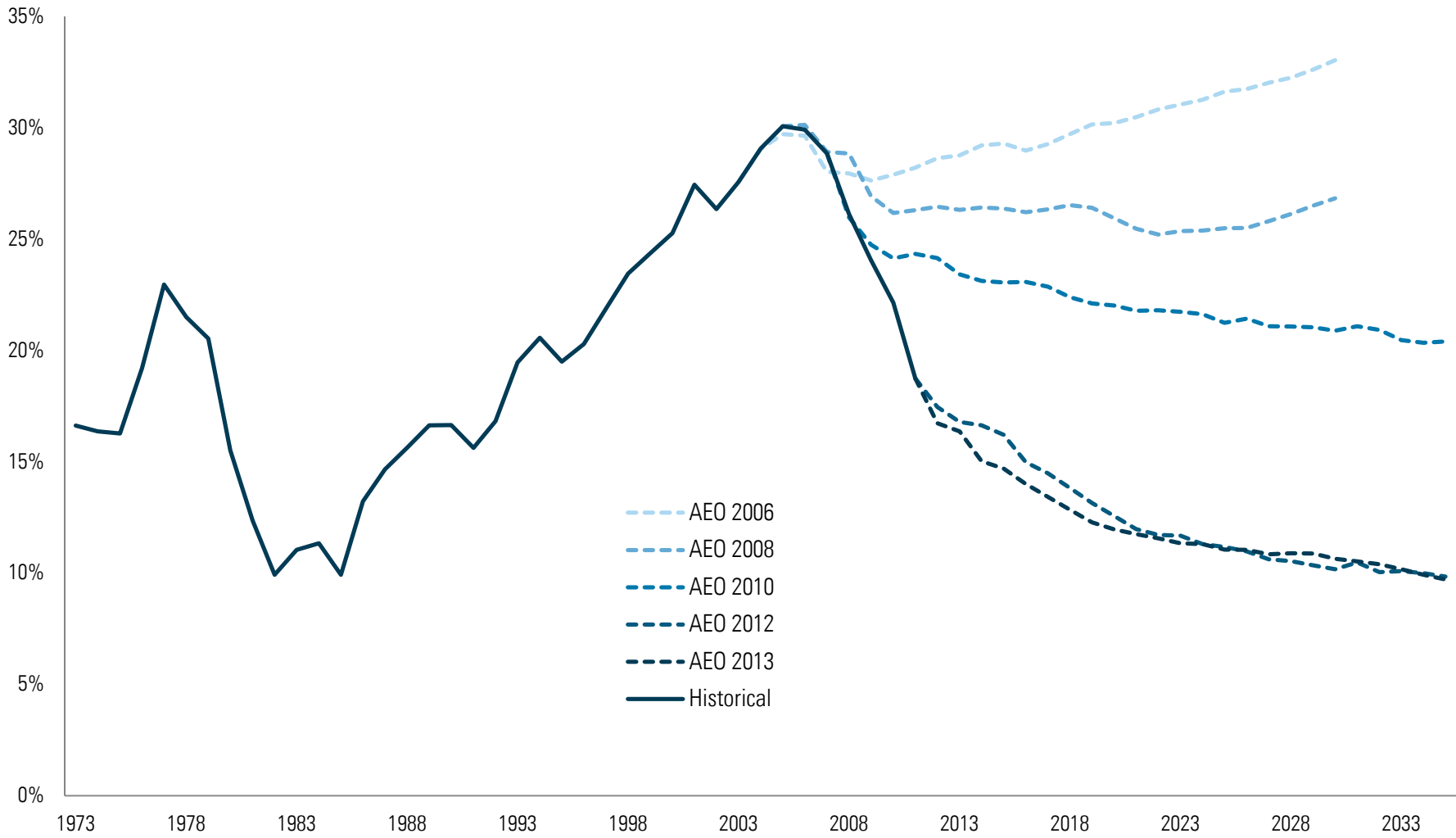
Current oil production forecasts

Crude and NGLs, million bbl/d



American energy independence?

Net energy imports as a share of consumption

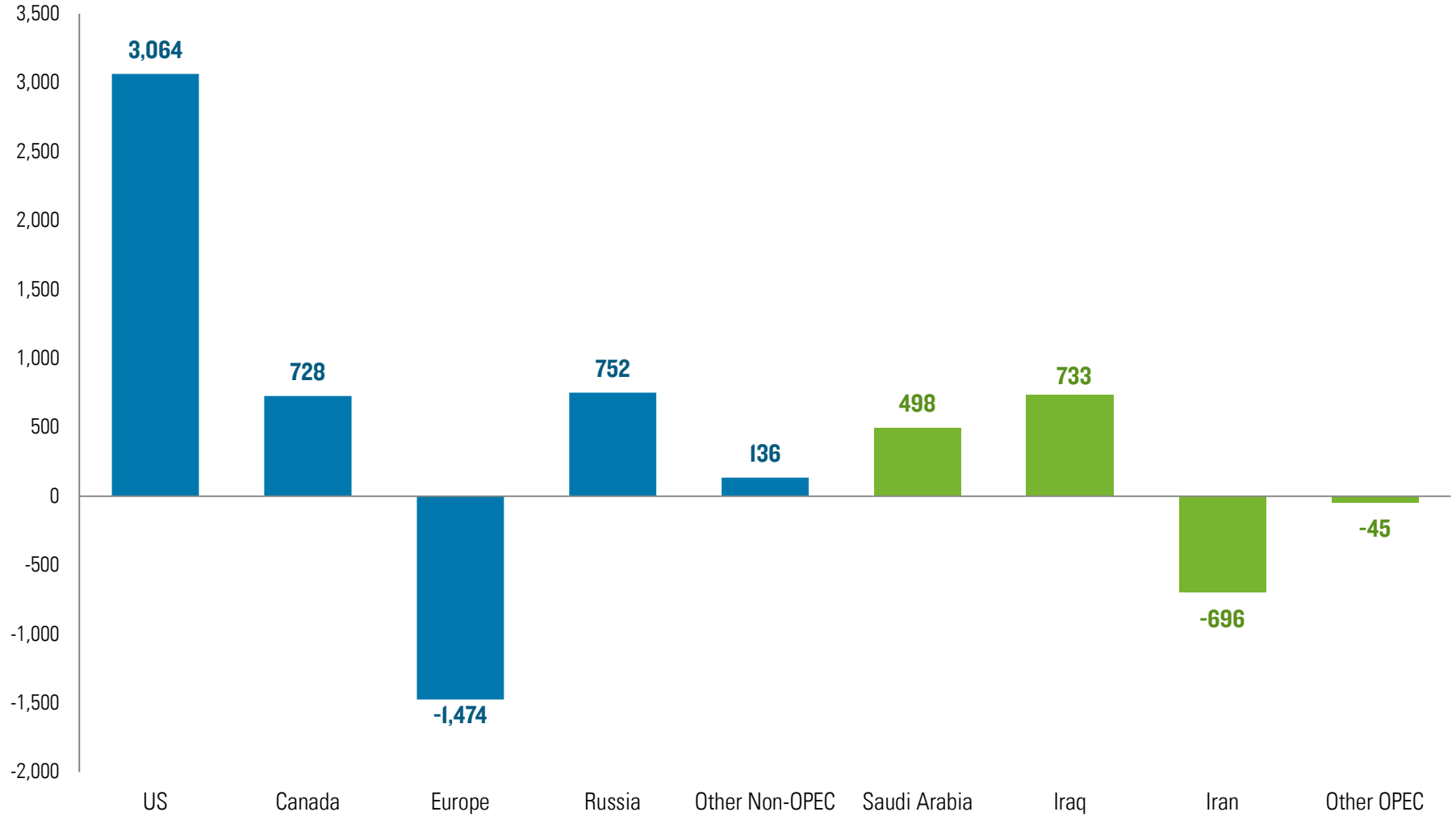


Source: EIA

Economic Impact

Change in global oil production, H1 2013 vs. H1 2008

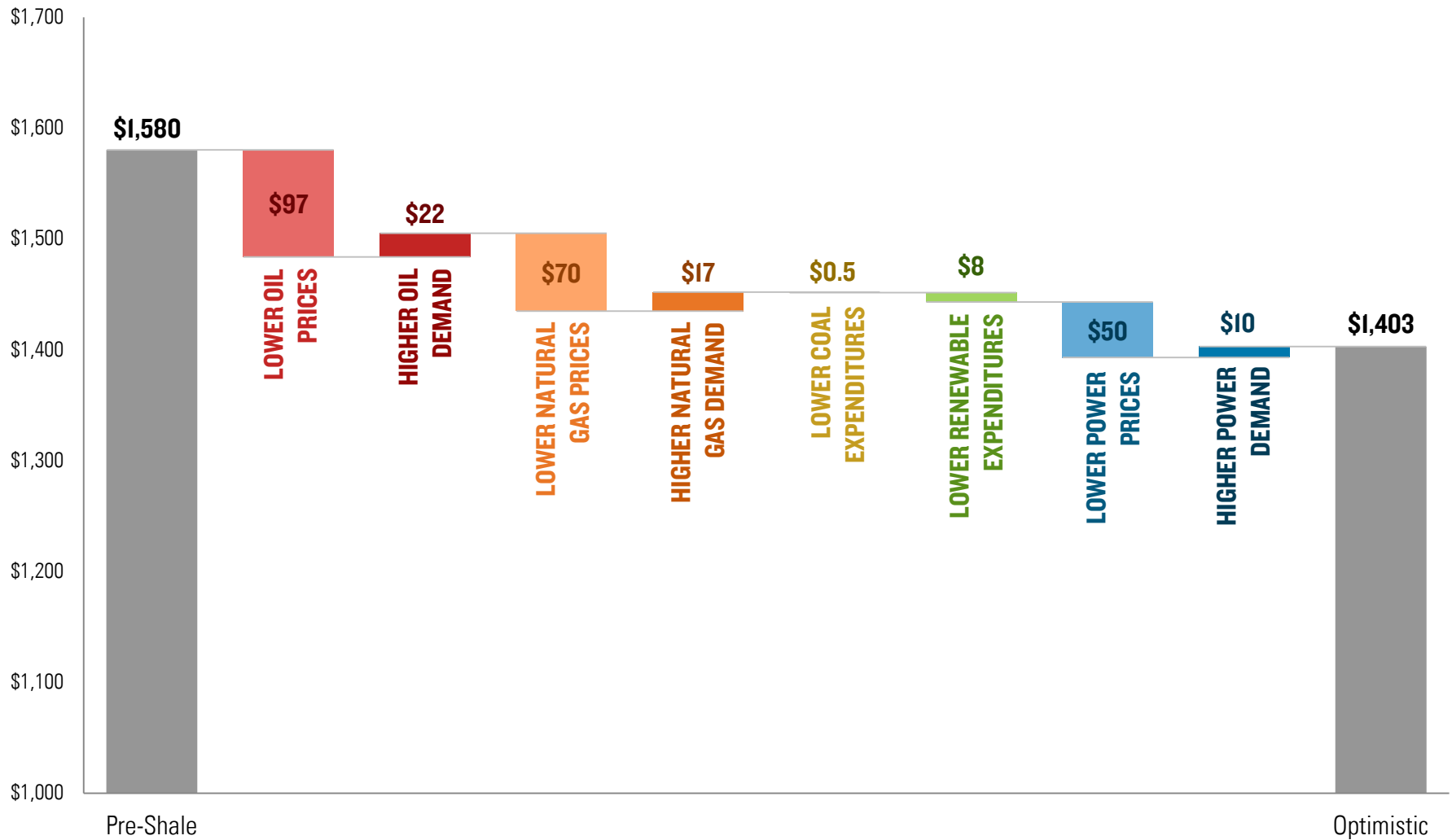
Thousand barrels per day



Source: EIA

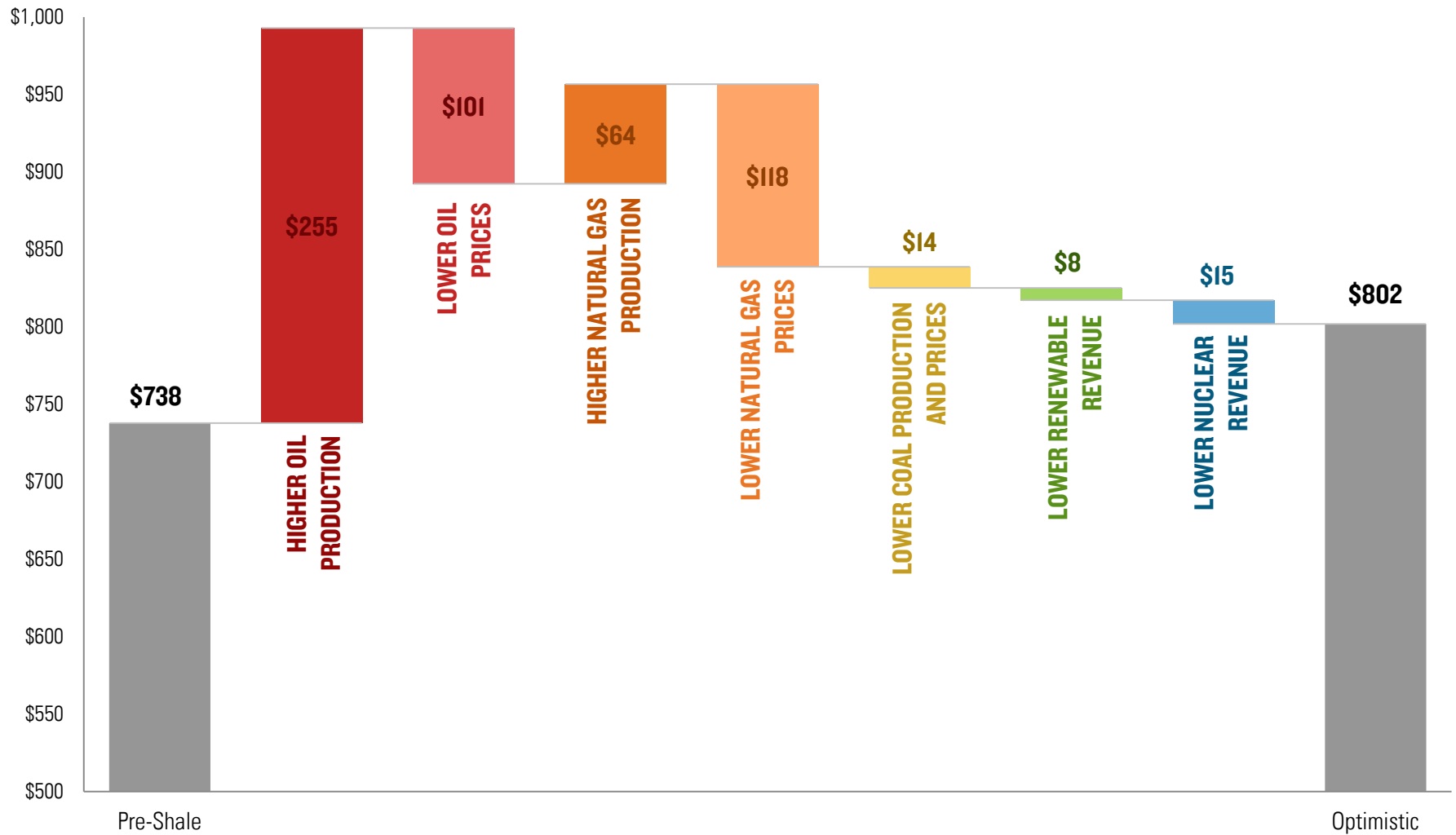
Change in consumer expenditures

Billion USD, 2013-2035 average



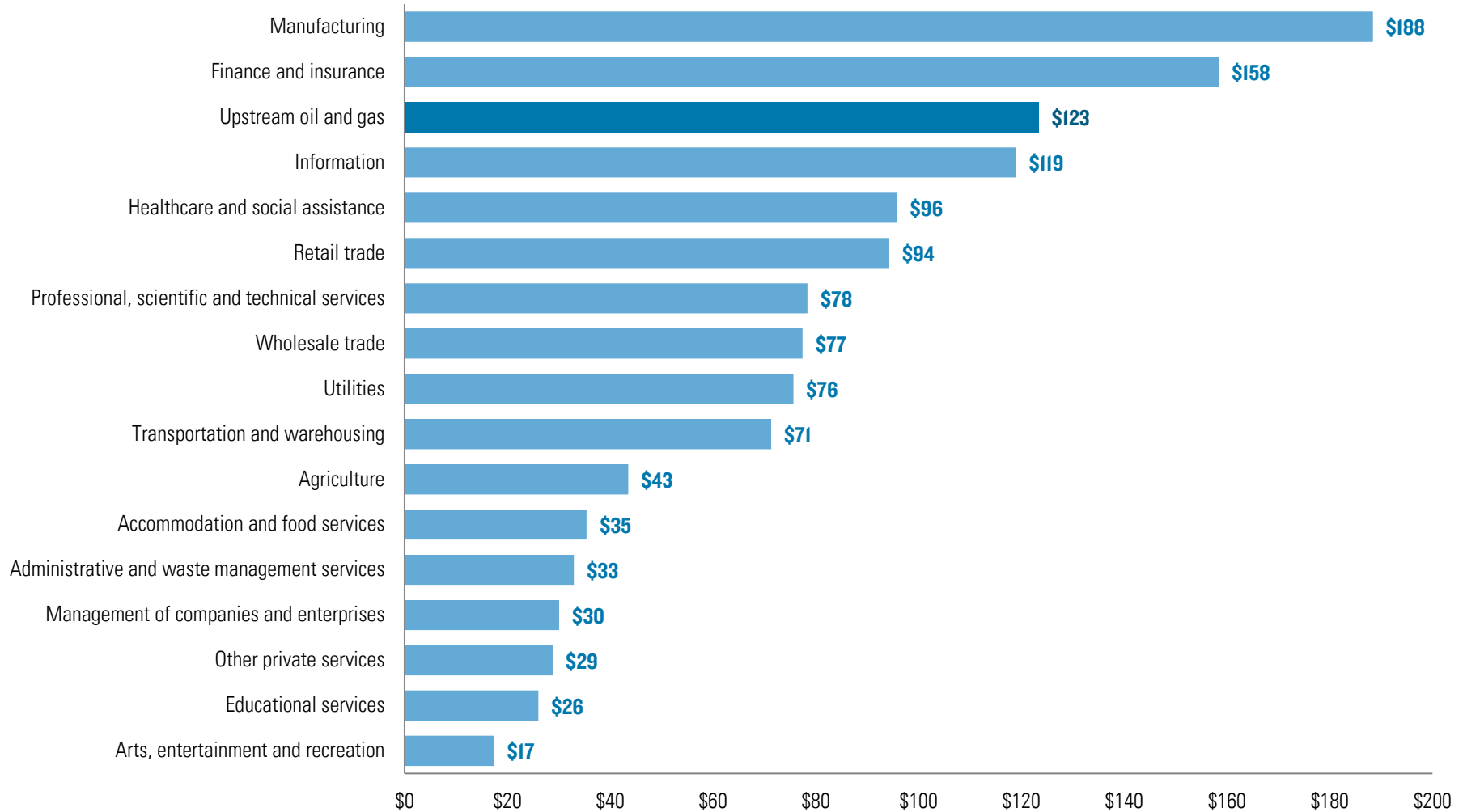
Change in producer revenue

Billion USD, 2013-2035 average



Fixed asset investment by industry

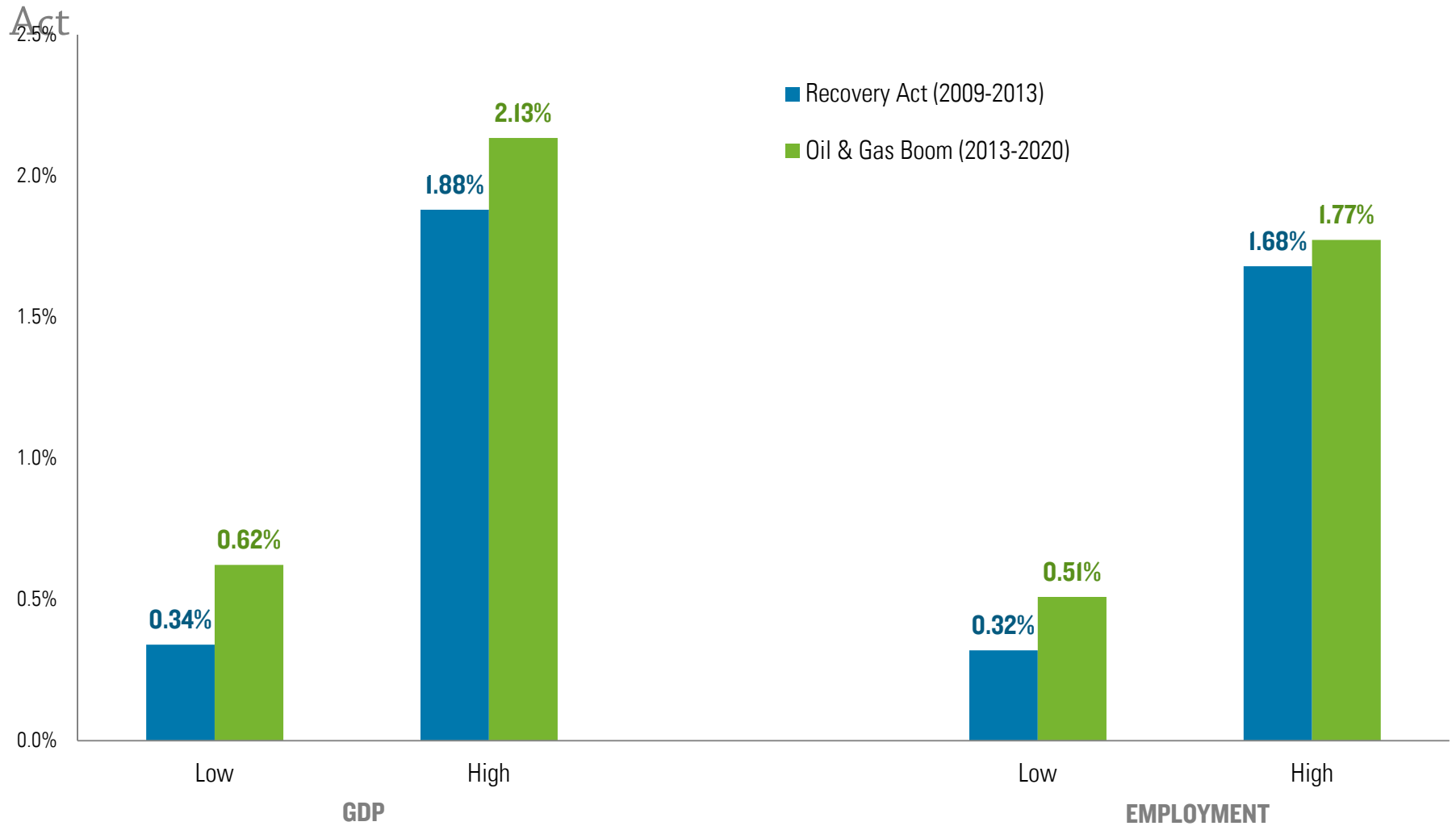
Billion 2005 chained dollars



Source: BEA

Textbook stimulus

Impact of the oil and gas boom vs. the American Recovery and Reinvestment Act

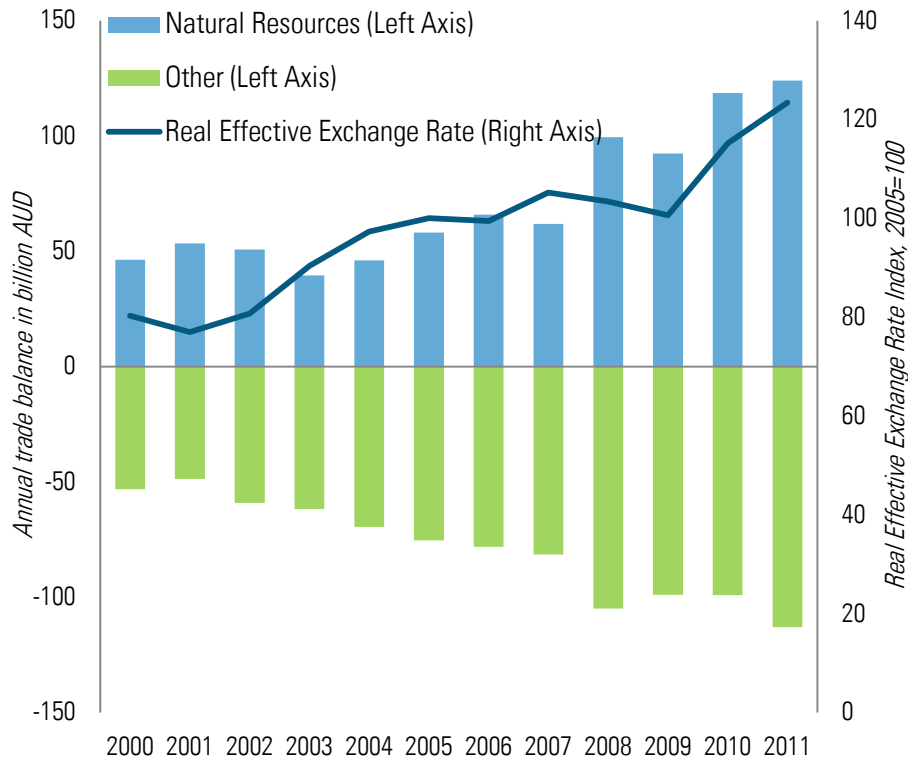


Source: Houser and Mohan

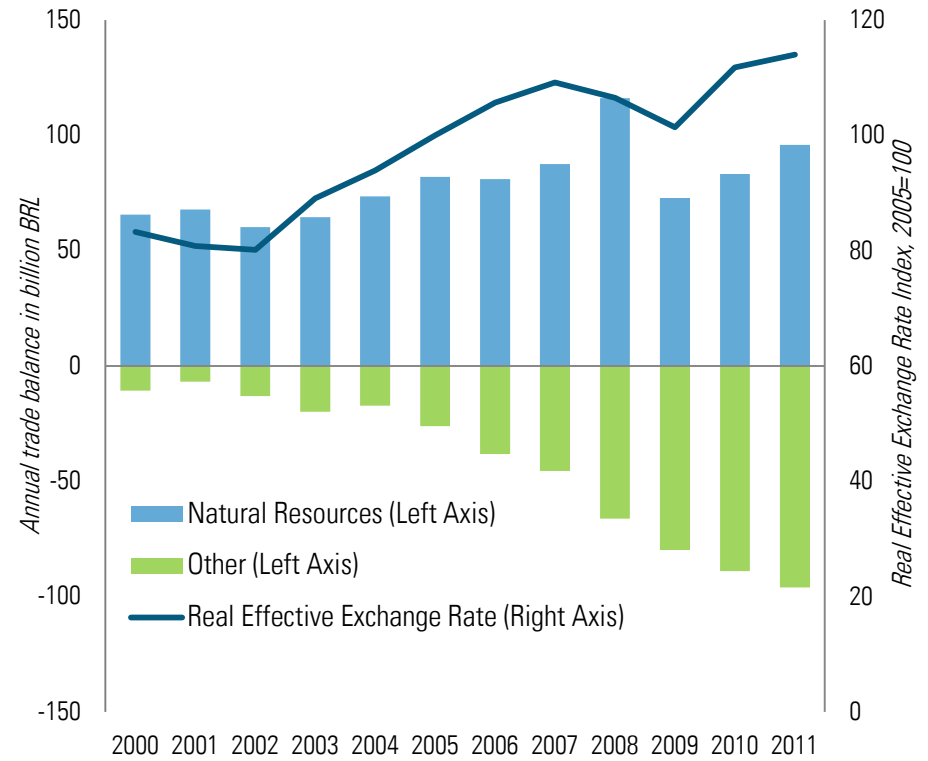
Dutch disease or Dutch sniffle?

Recent precedents

AUSTRALIA



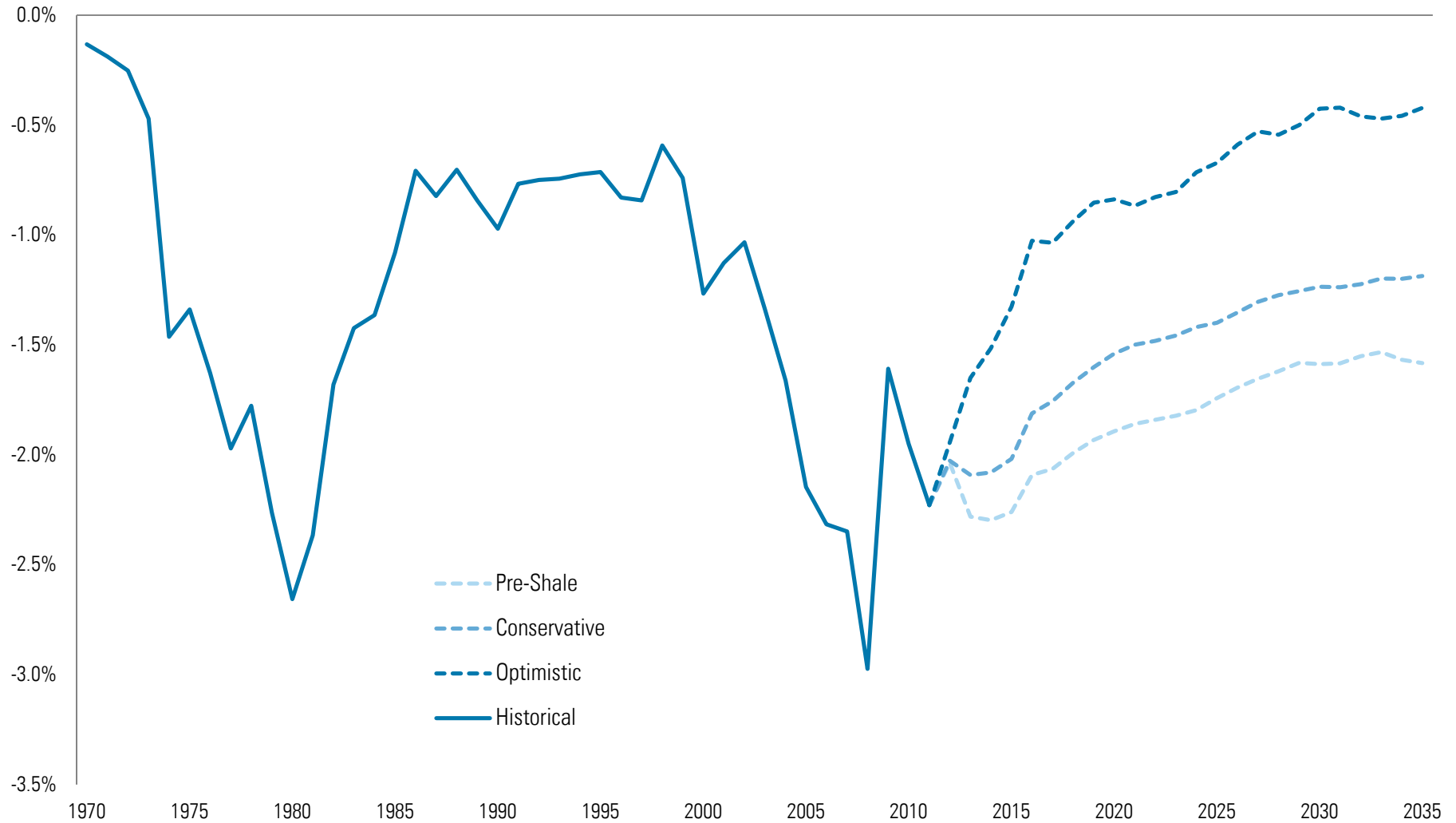
CANADA



Source: IMF, UN Comtrade

Energy trade deficit

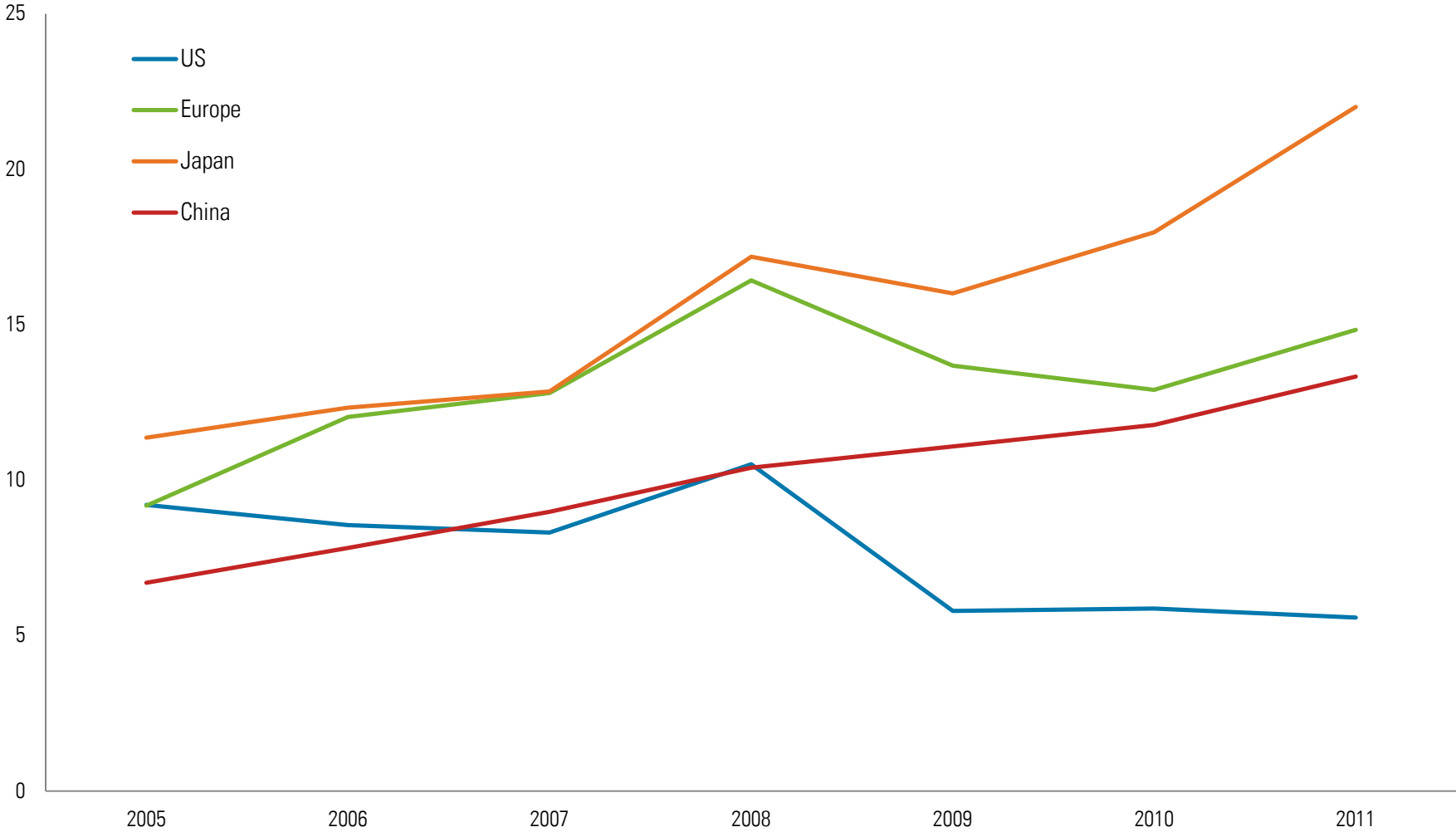
As a percent of GDP



Source: Houser and Mohan

Natural gas prices for industrial consumers

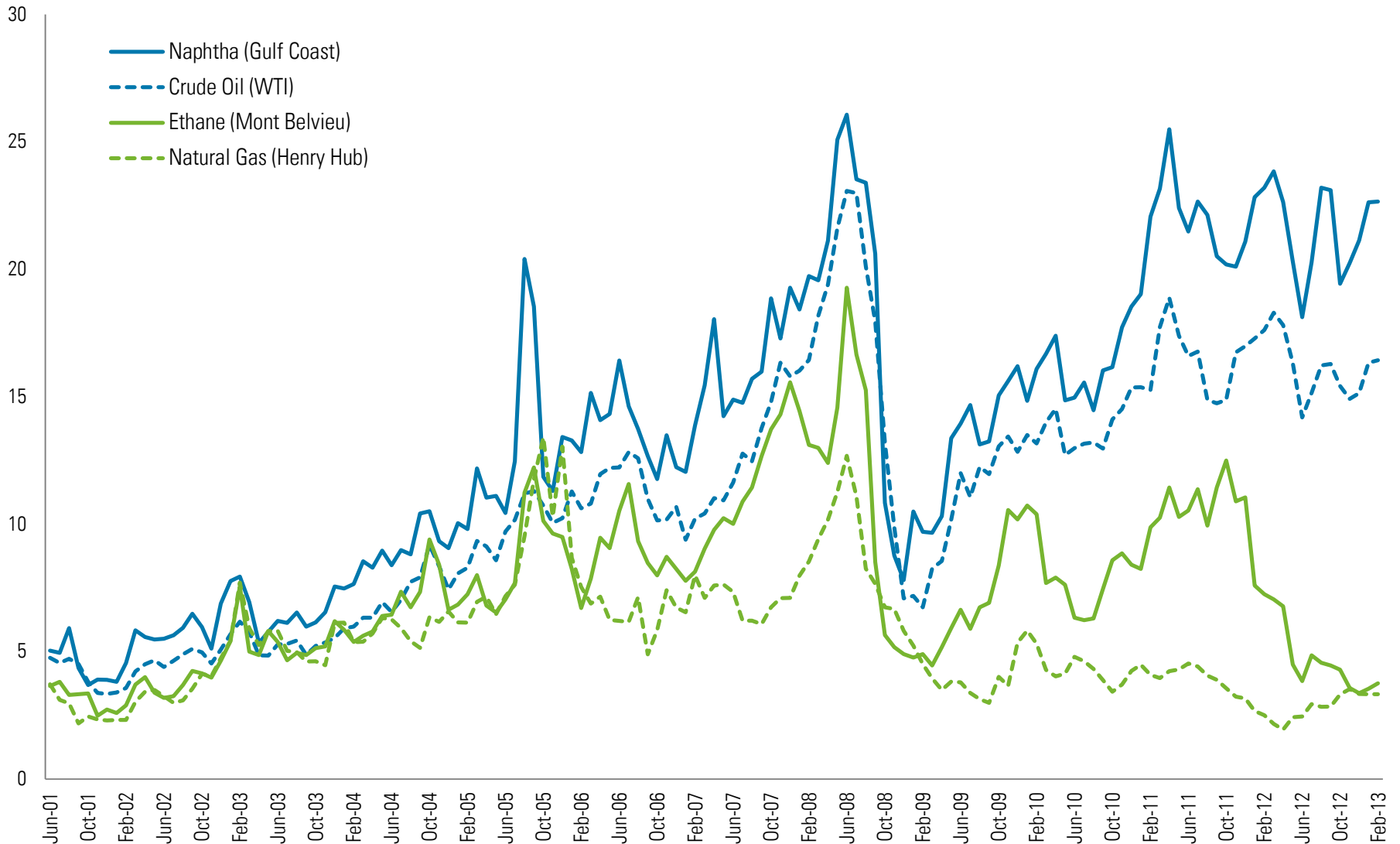
USD per MMBTU



Source: EIA, IEA

A boon to US chemicals production

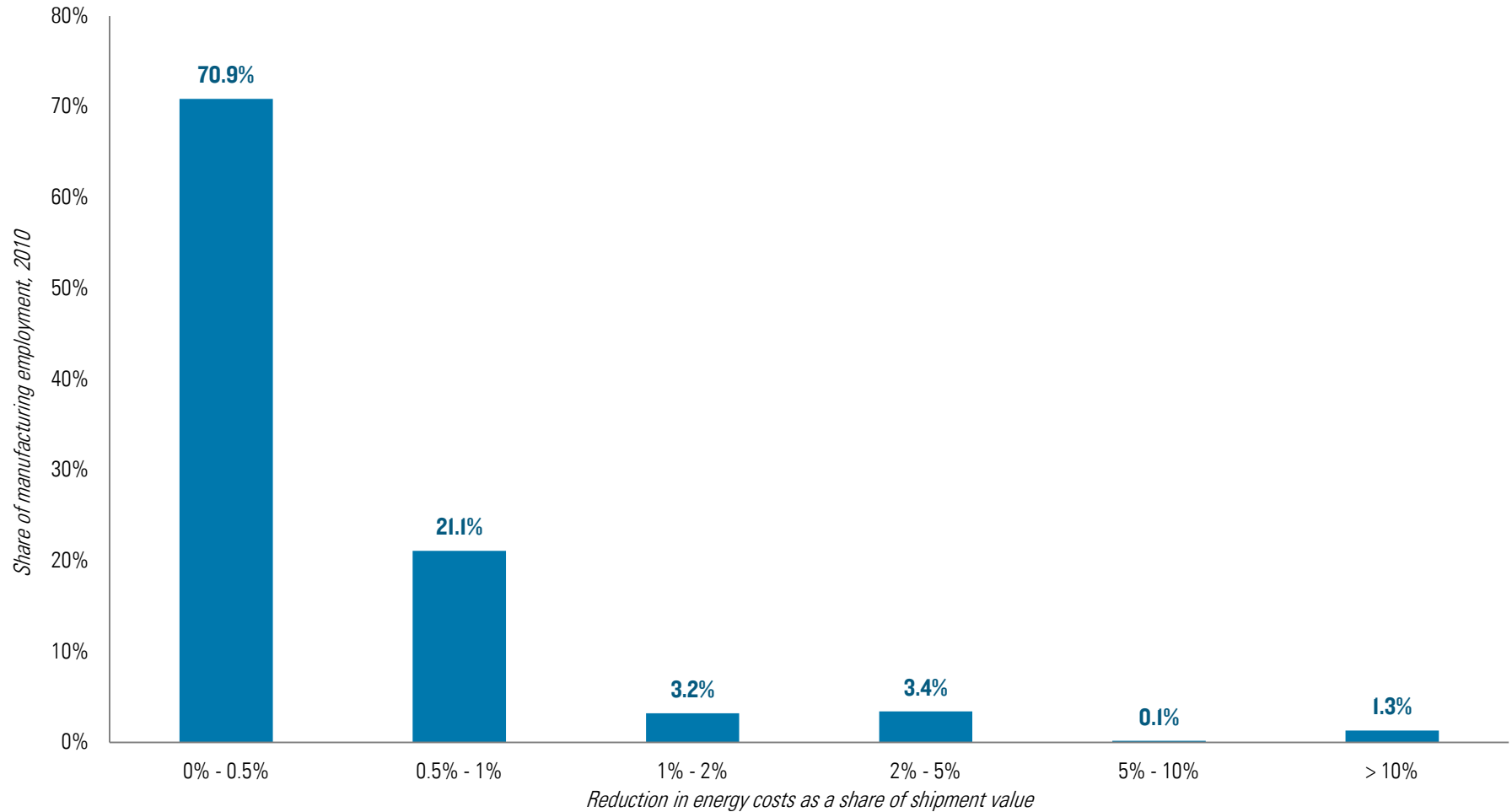
Feedstock cost, USD per MMBTU



Source: EIA, Bloomberg

Energy-intensive industry in perspective

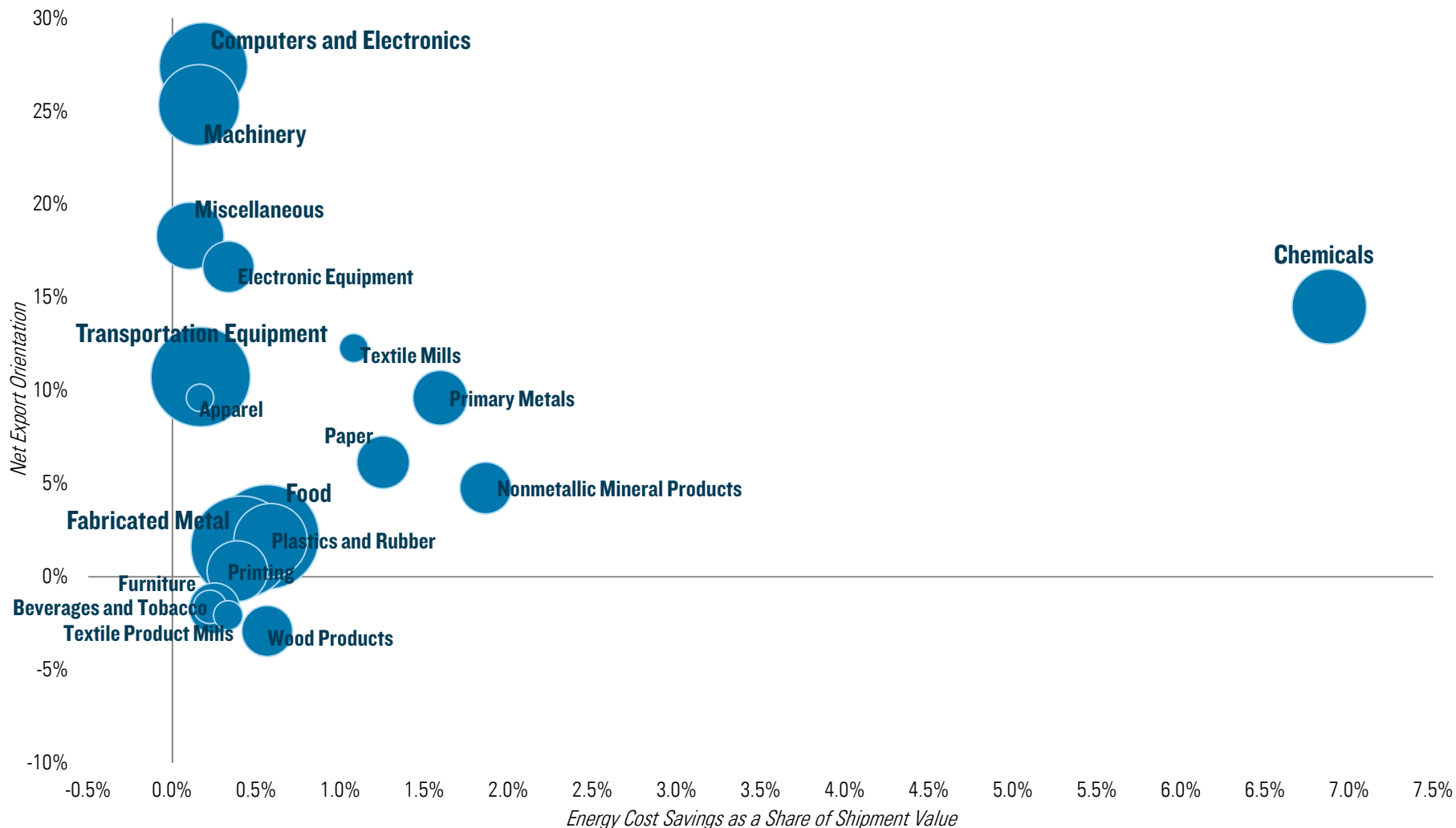
Potential reduction in energy costs as a share of shipment value



Source: Houser and Mohan

Balancing energy savings against exchange rate effects

Potential cost reductions vs. net export exposure

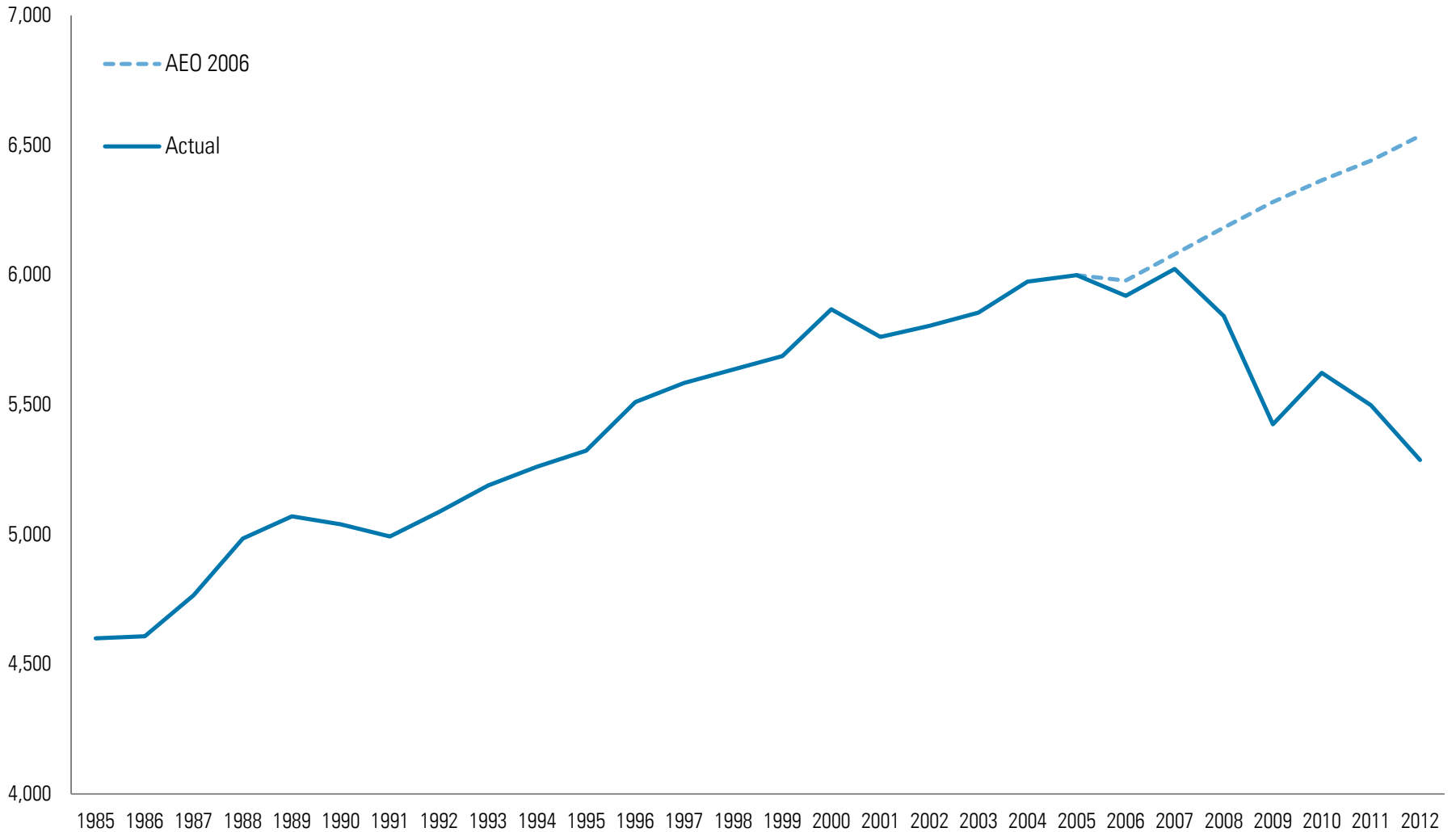


Source: Houser and Mohan

Environmental Effects

US CO2 emissions have dropped sharply

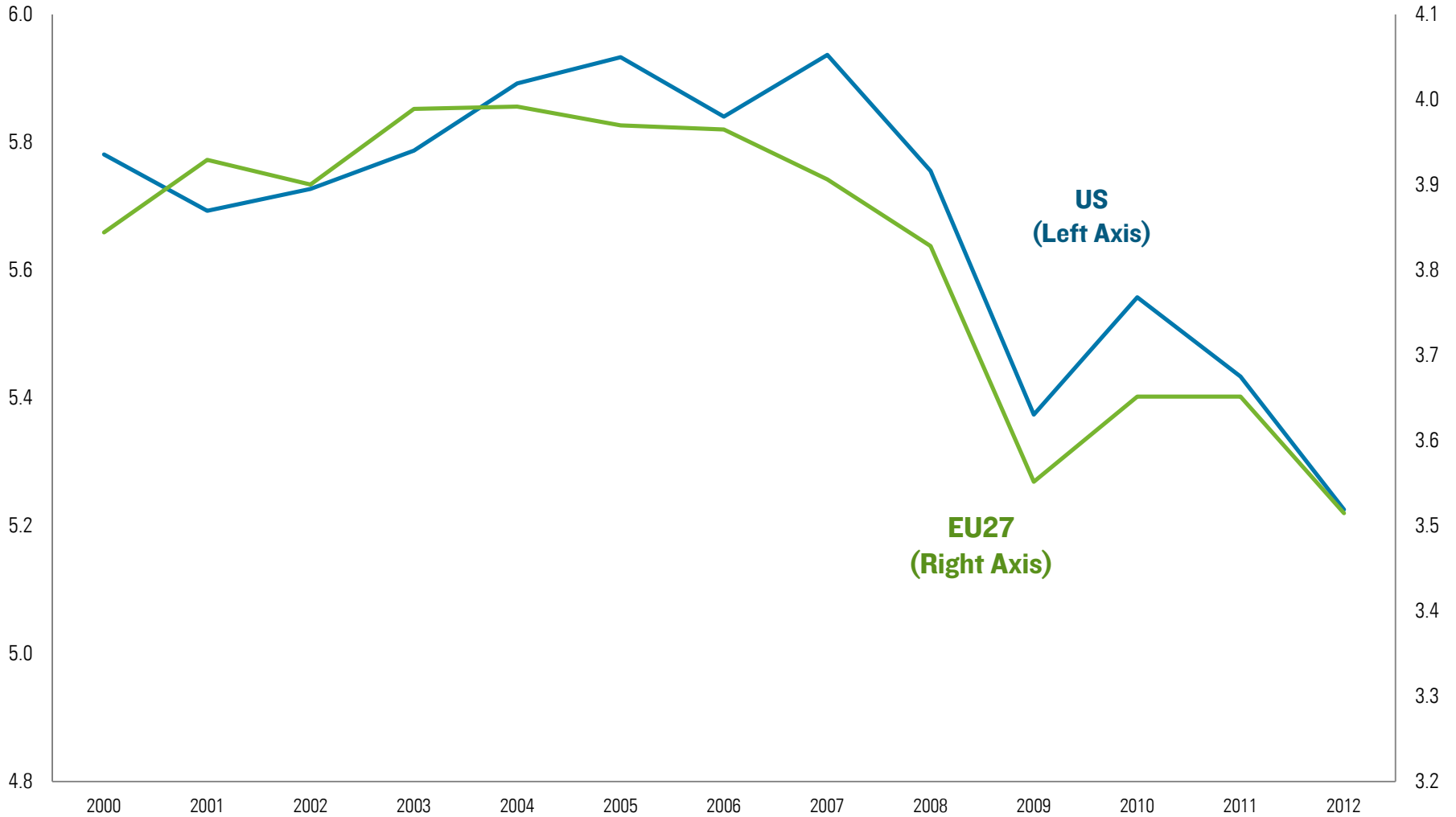
Actual vs. projected energy-related CO2 emission, million tons



Source: EIA

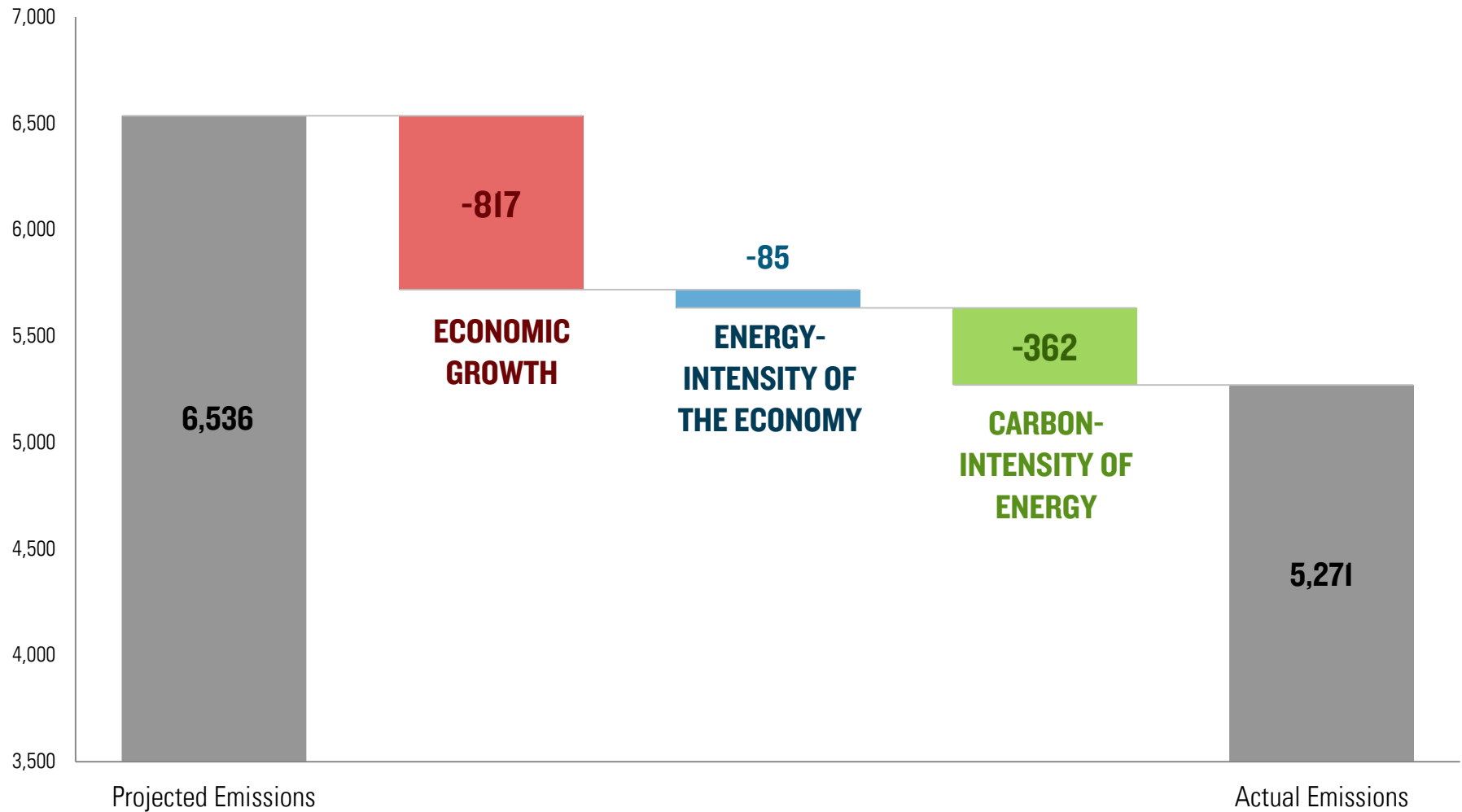
CO2 emissions, US vs. EU

Billion tons



What explains the drop?

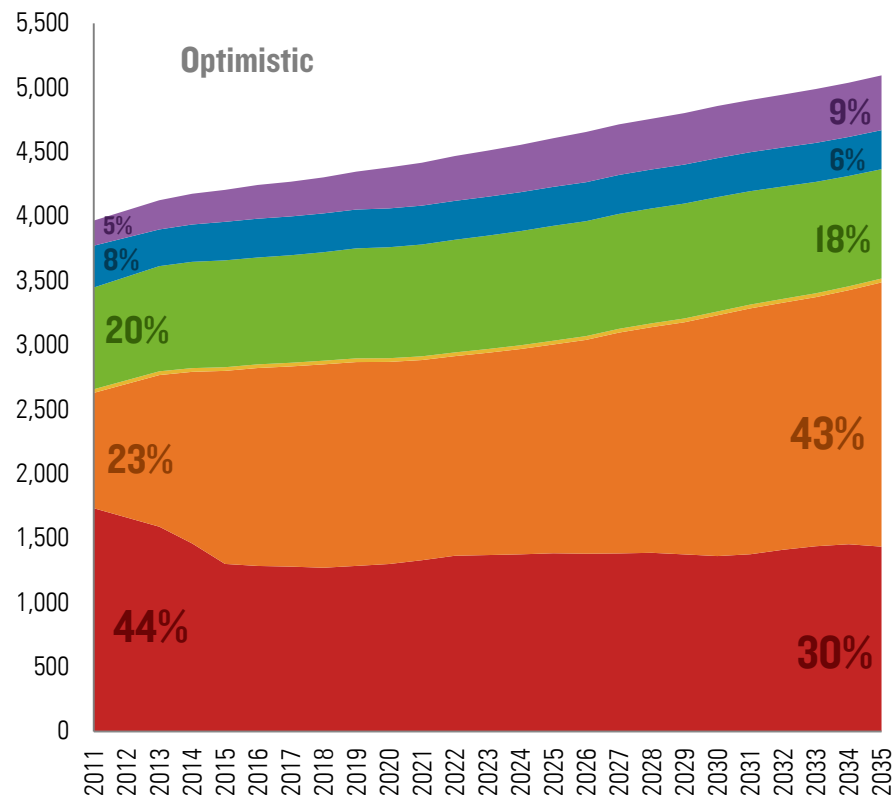
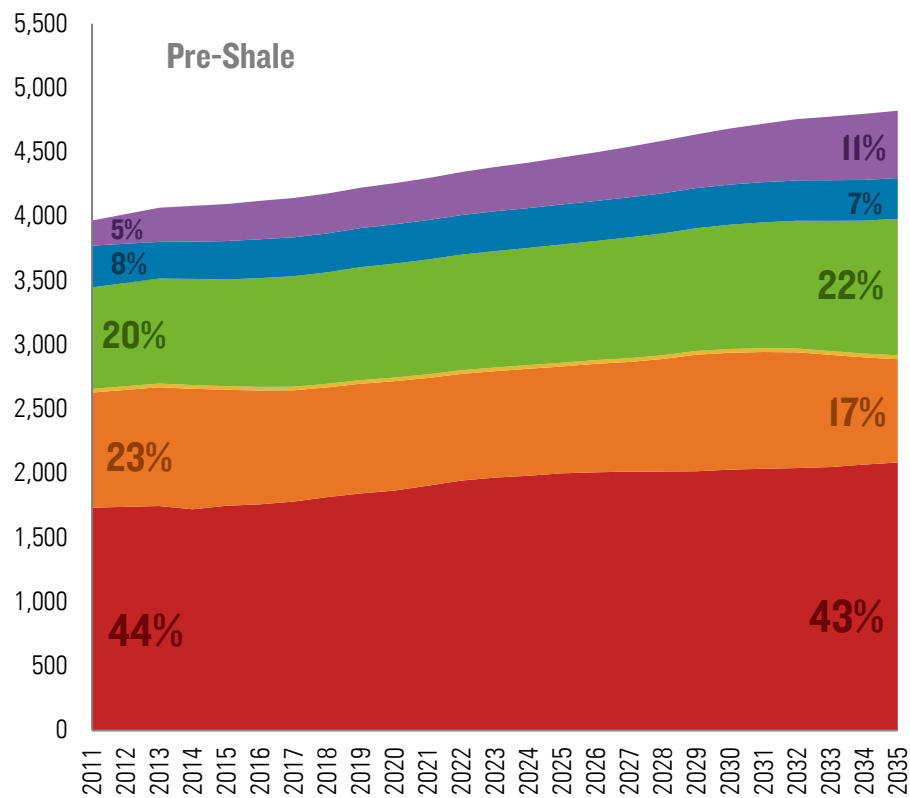
Actual vs. projected energy-related CO2 emissions in 2012



Source: EIA, BEA, authors' estimates

Power generation – pre-shale vs. optimistic

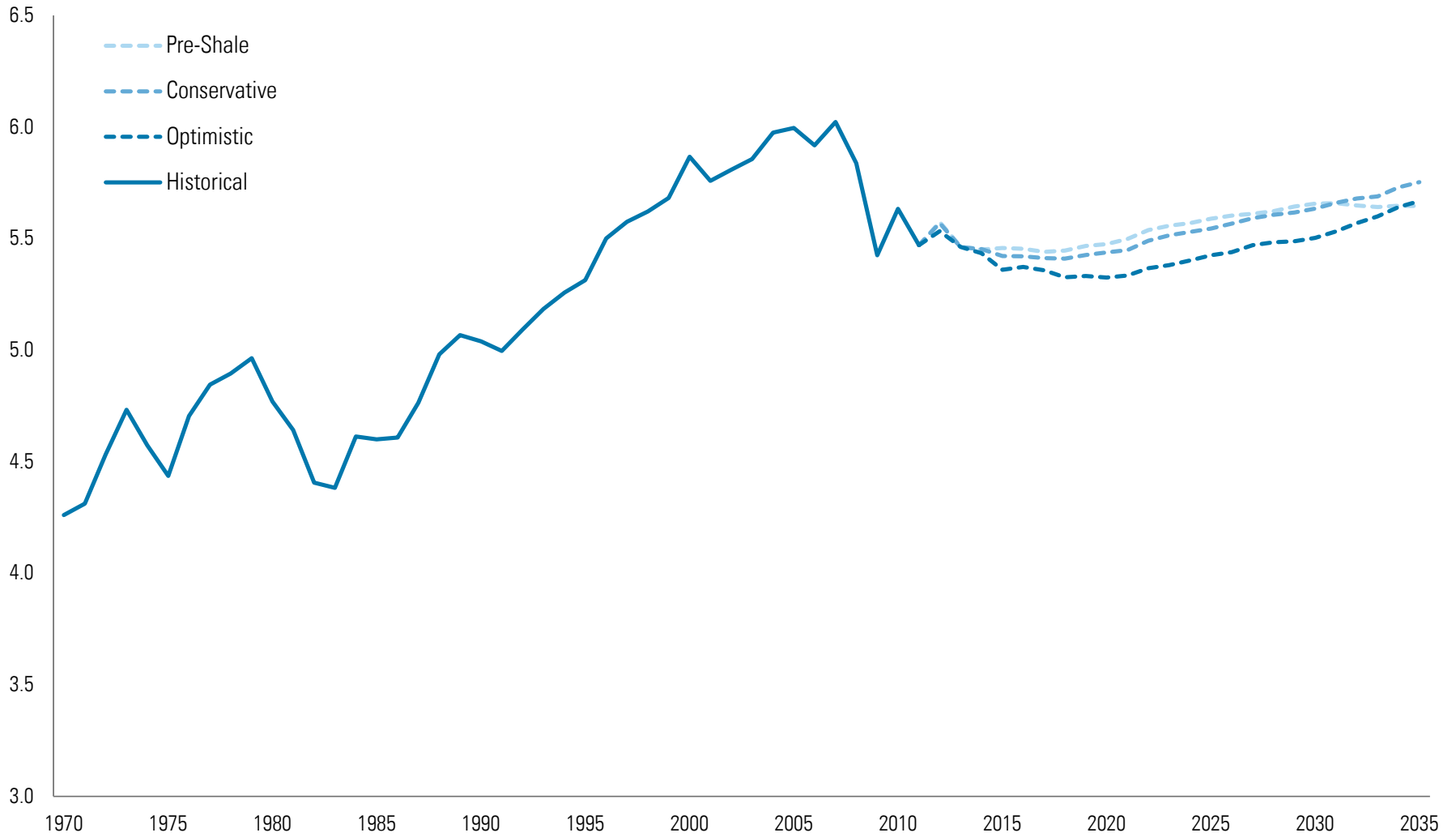
Billion kwh



■ Coal
 ■ Nat Gas
 ■ Petroleum
 ■ Nuclear
 ■ Hydro
 ■ Other Renewables

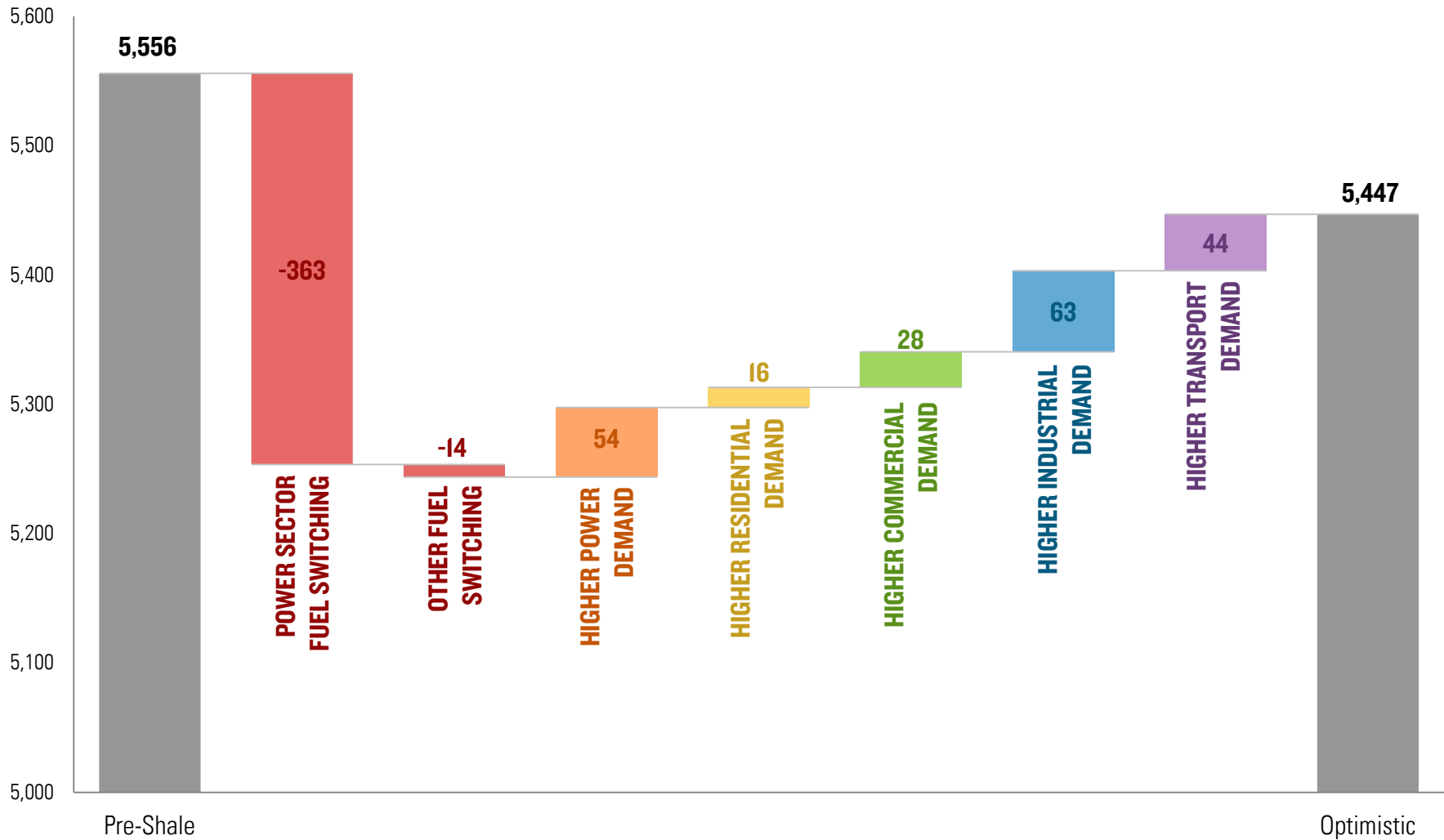
US CO2 emissions

Billion tons



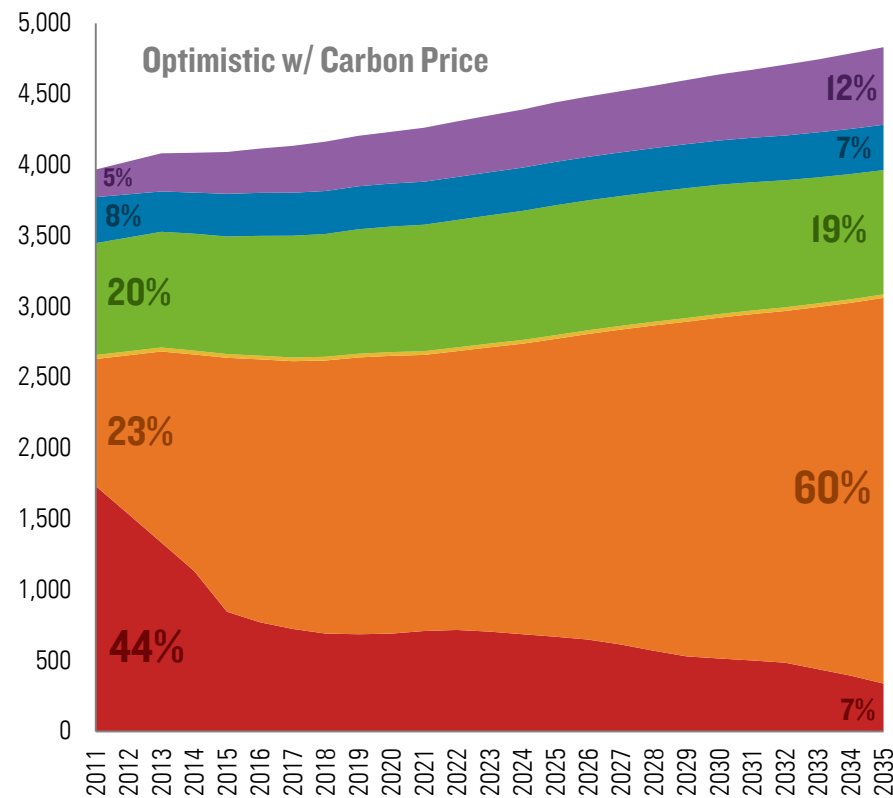
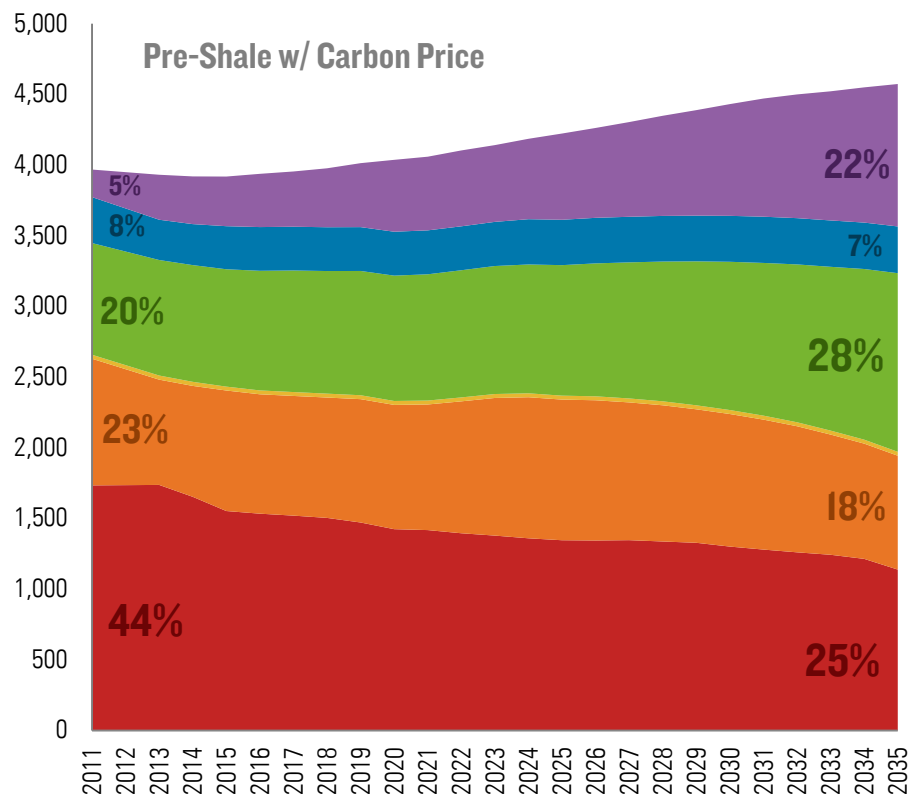
Change in US CO2 emissions by source

Million tons, 2013-2035 annual average



Power generation – pre-shale vs. optimistic w/ carbon price

Billion kwh

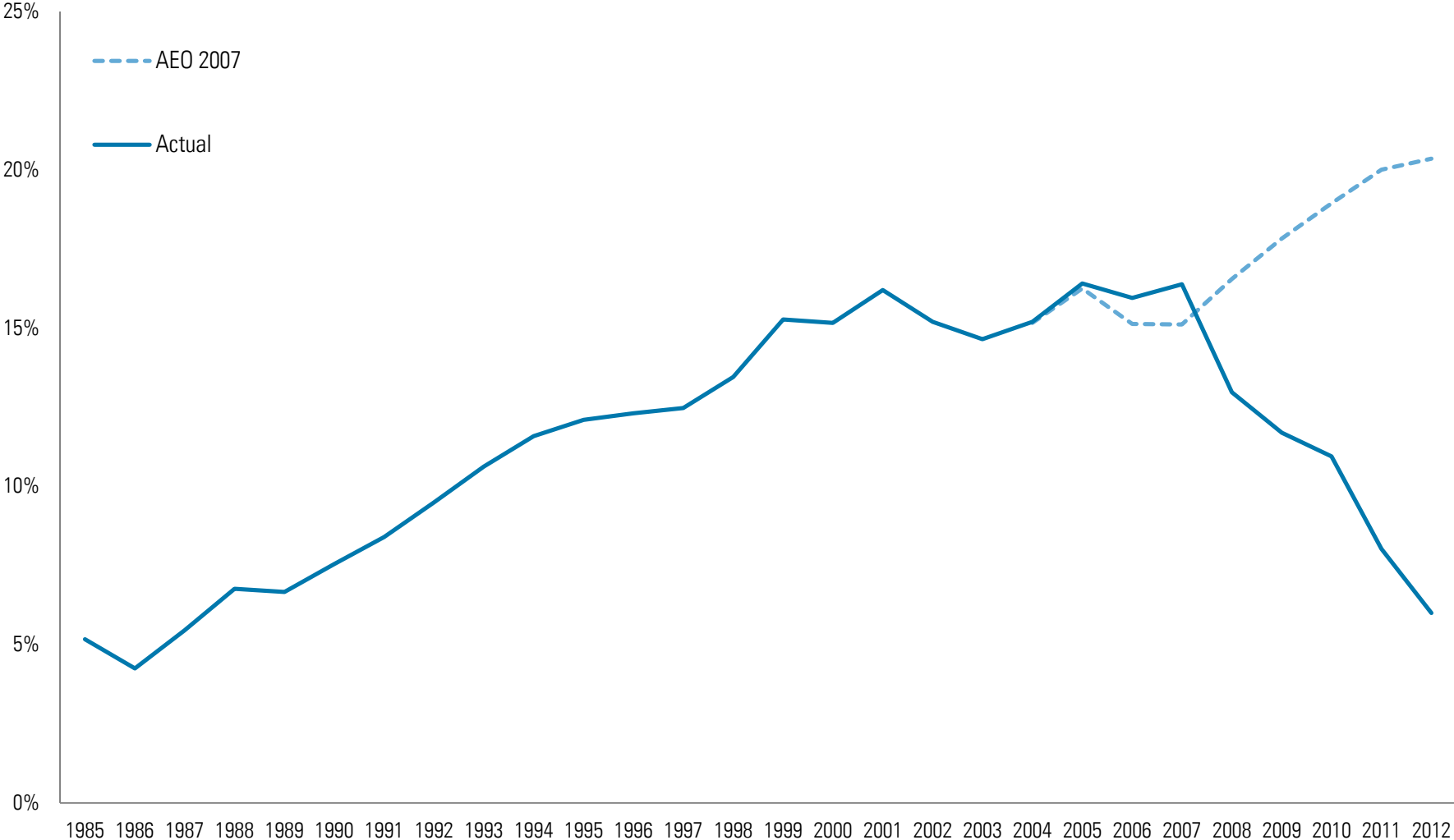


■ Coal
 ■ Nat Gas
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 ■ Other Renewables

Trade Policy Implications

Natural Gas Trade

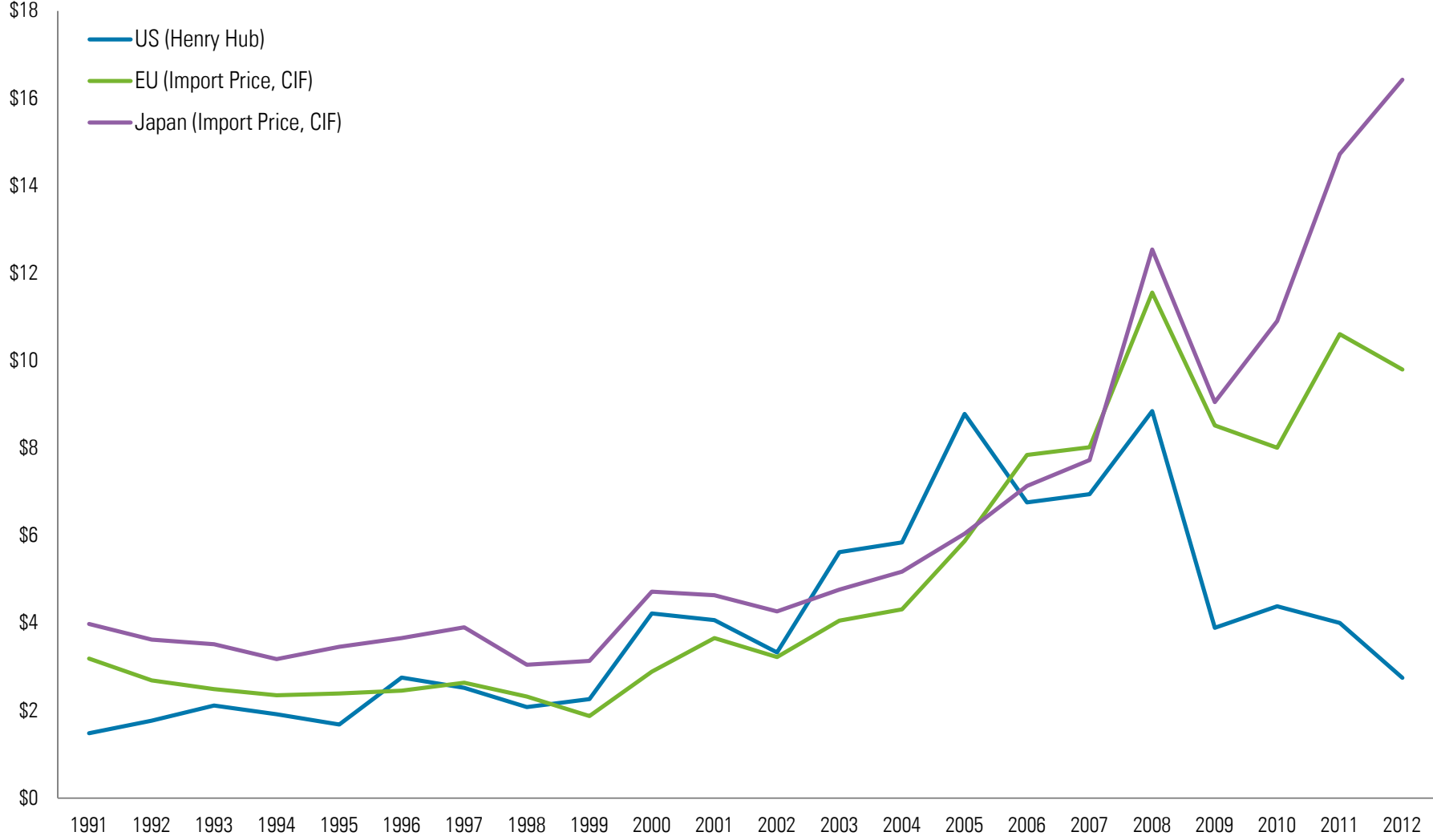
Net Imports as a share of US consumption, 2007 projections vs. actual



Source: EIA

Natural Gas Price Spread

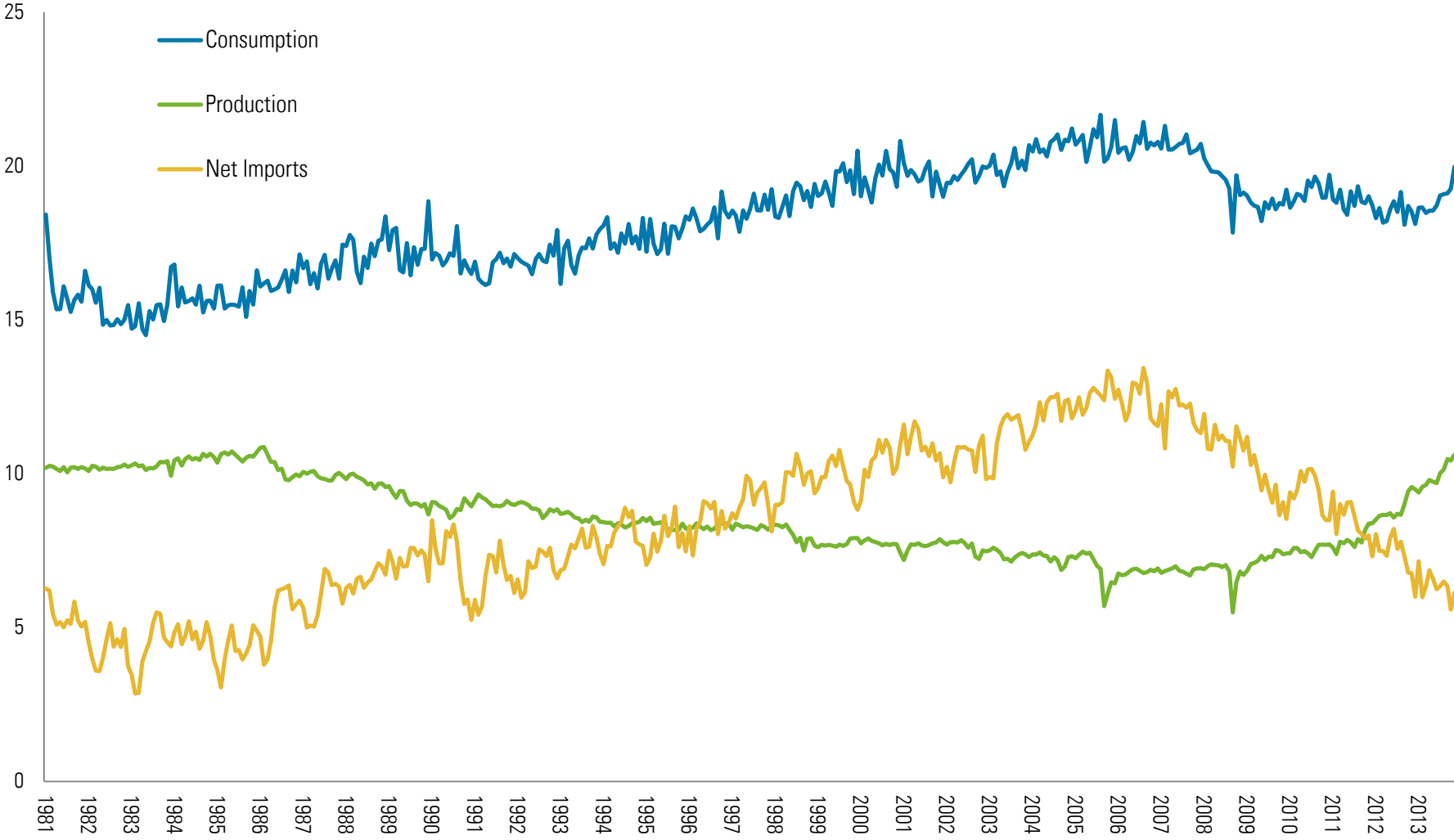
USD per MMBTU



Source: BP and Bloomberg

Turnaround in US oil trade

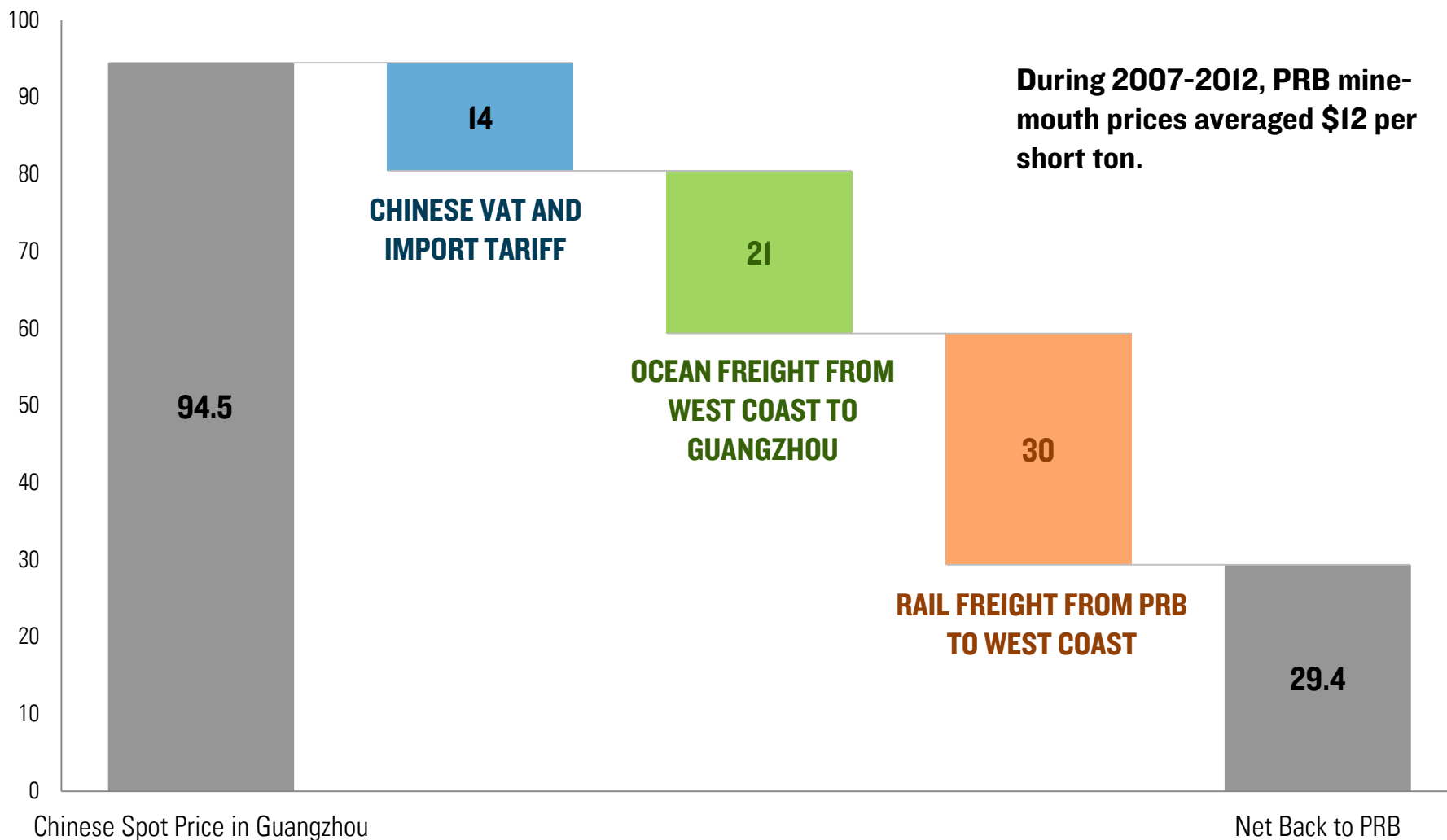
Million bbl/d



Source: EIA and RHG estimates

Average Net Back to the Powder River Basin, 2007-2012

\$ per short ton, 8800 btu/lb



Source: Bloomberg, SX Coal and Rhodium Group estimates



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