



Perspective on the U.S. Coal Industry

February 2015

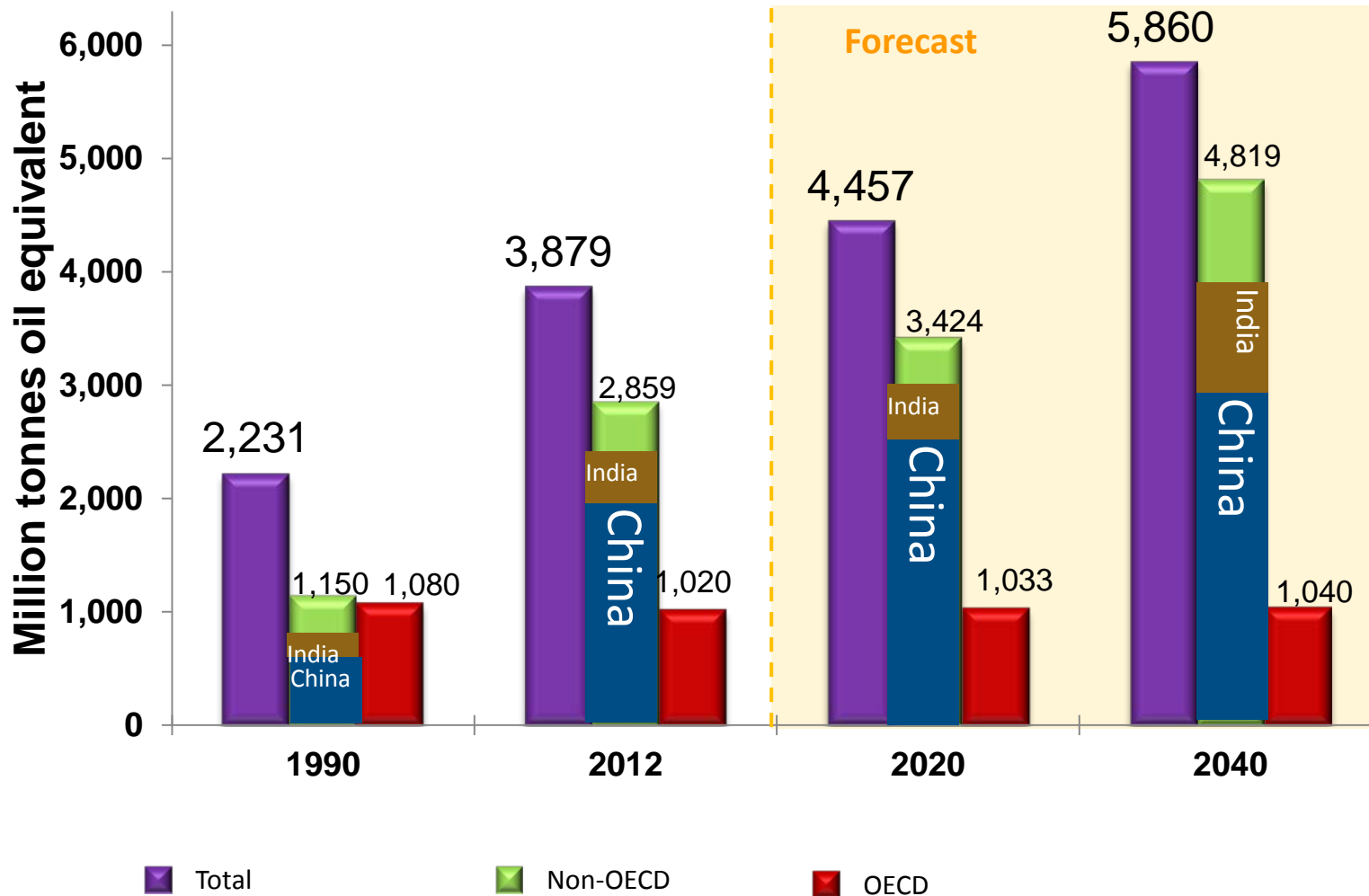
NETL Contact: Gavin Pickenpaugh

This presentation provides an overview of the coal industry, focusing on the United States, but within a global context. Areas covered include coal prices, consumption, production, imports, exports, reserves, productivity measures, and more. Juxtapositions between the U.S. and other countries' coal industries are provided. In addition to providing a current snapshot of the U.S. coal industry, this work portrays both historical and projected aspects of the coal industry.

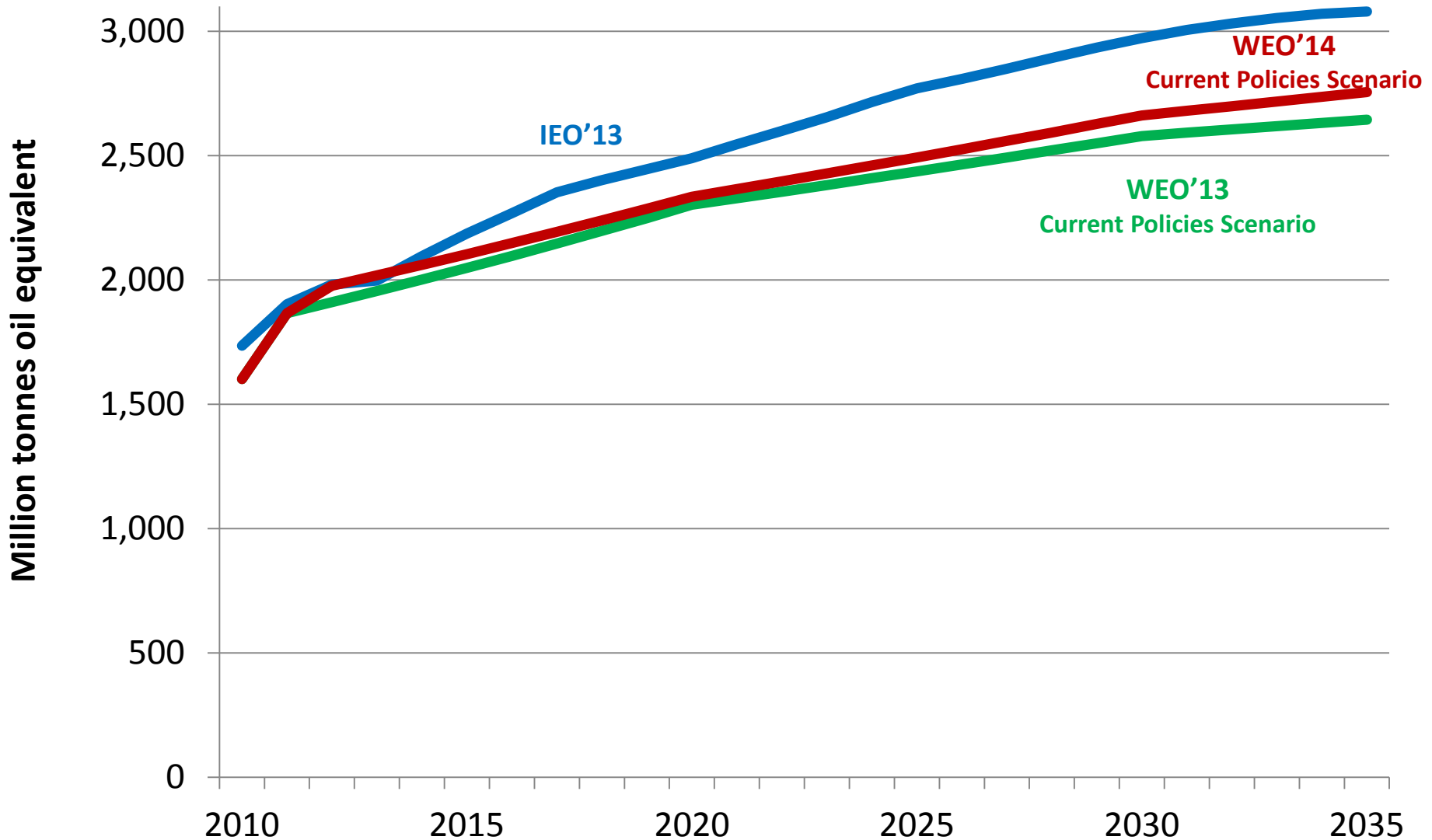
Global View

World Coal Consumption

1990 – 2040 (WEO'14, Current Policy Scenario)



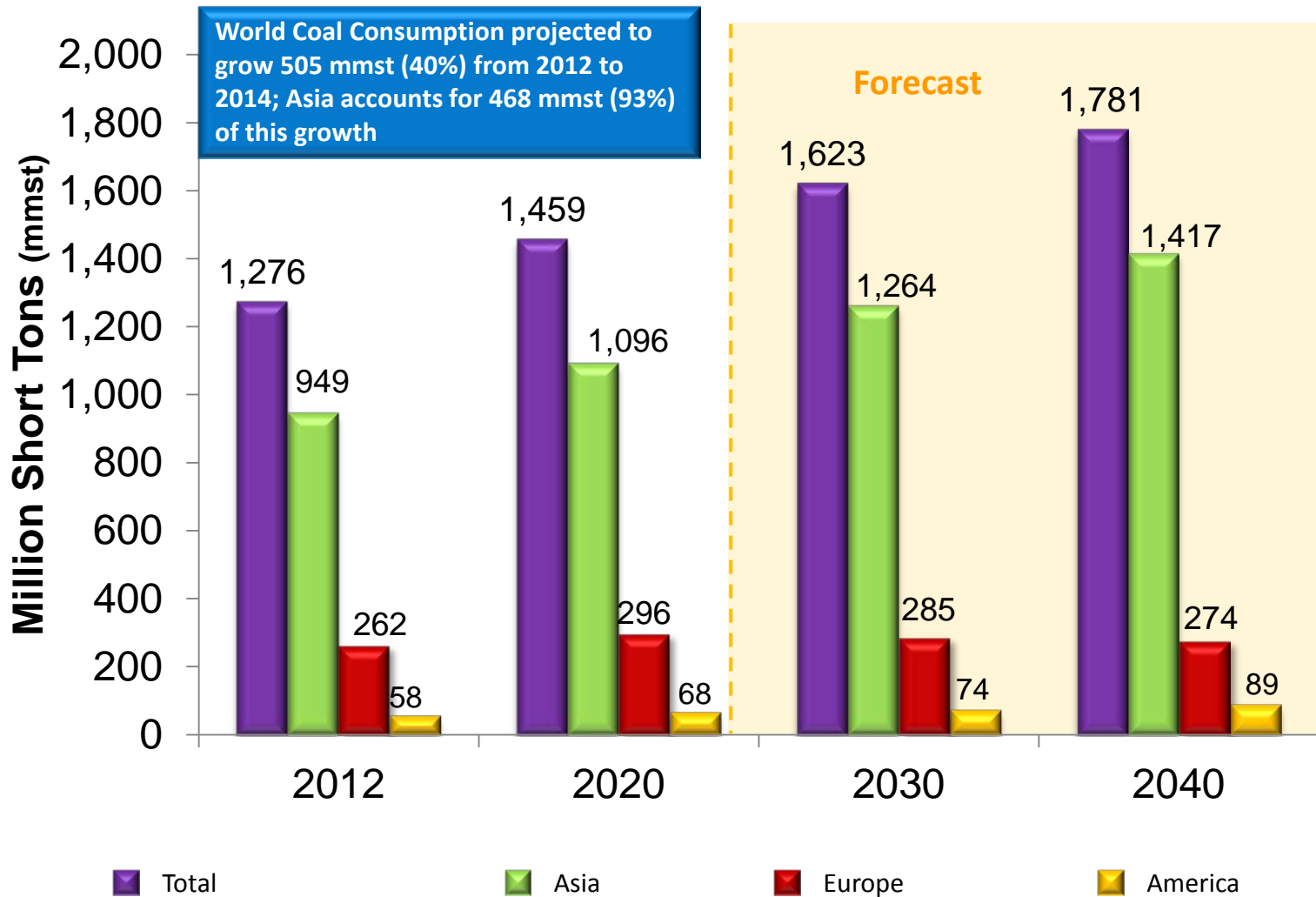
China Coal Consumption Projections



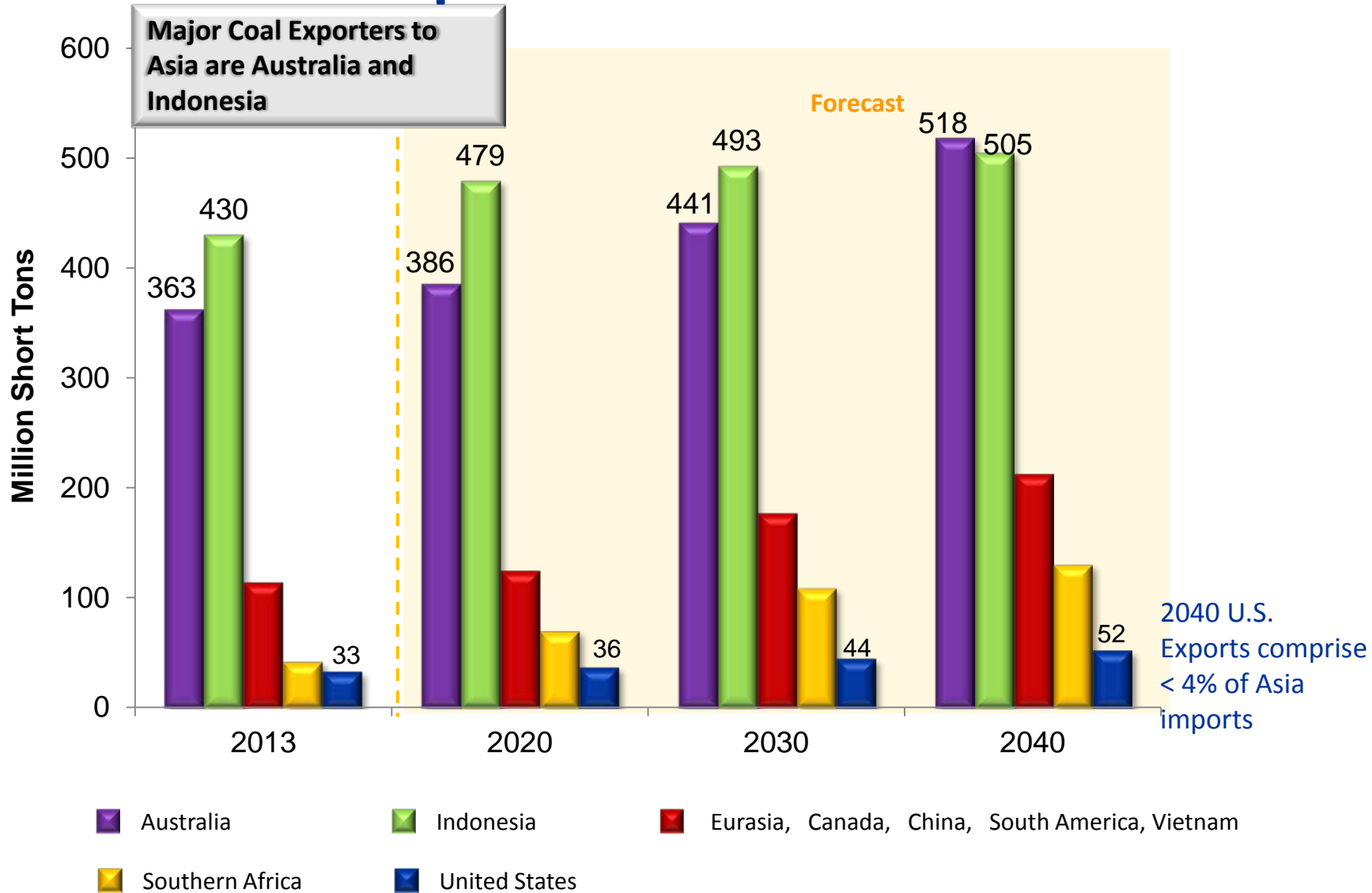
Sources: EIA, IEO'13; IEA, WEO'13, WEO'14. *One tonne oil equivalent = 40 million btu; numbers are interpolated for WEO'13 and '14.



World Coal Imports by Region

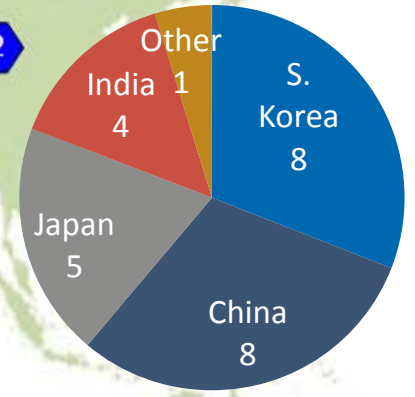
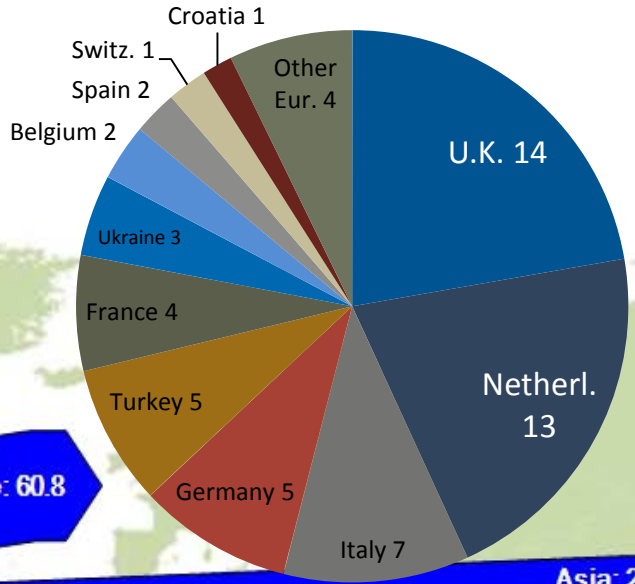
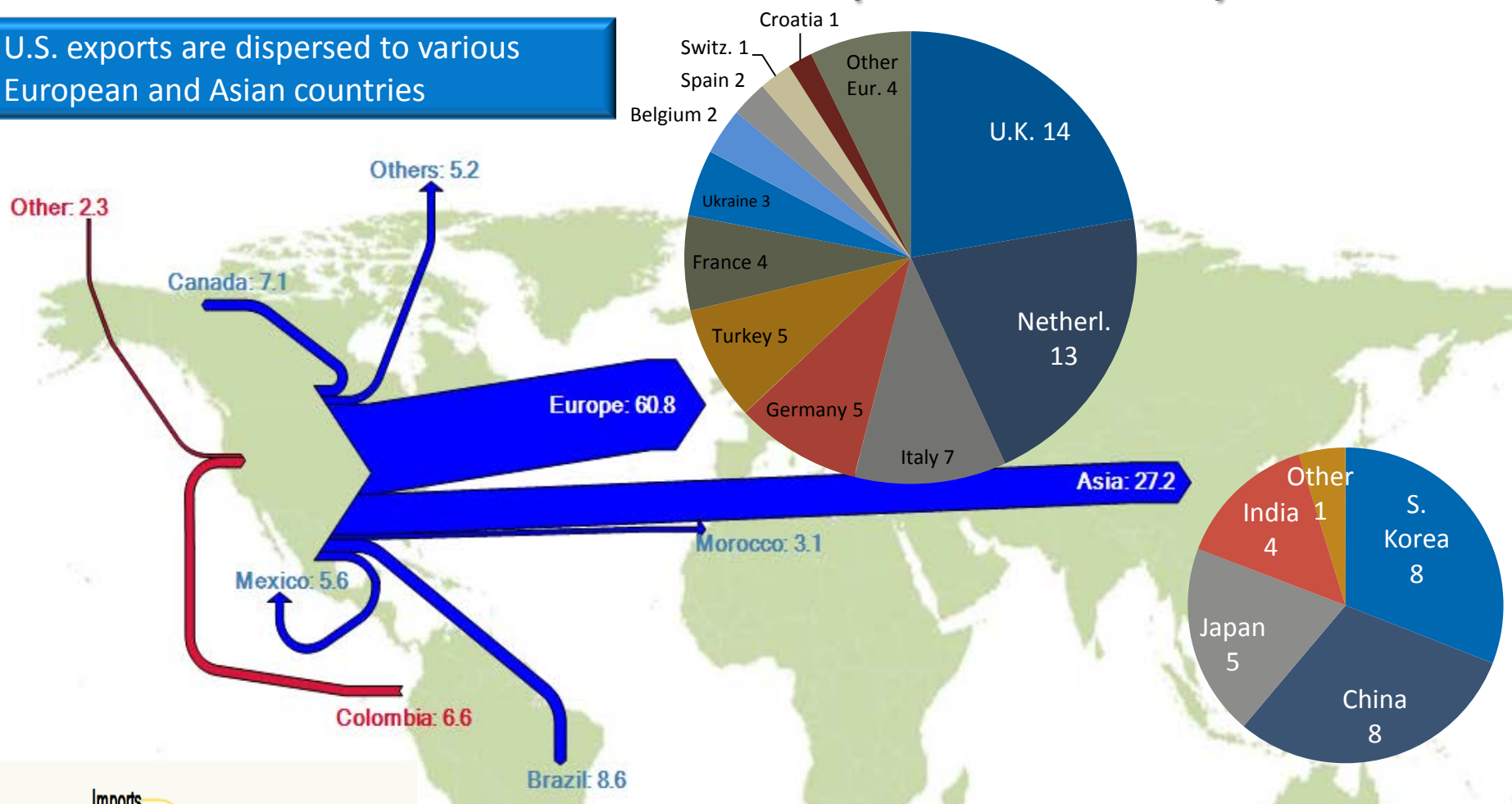


Coal Exports to or within Asia

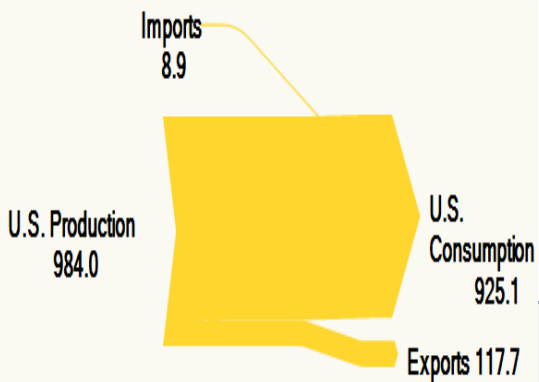


2013 U.S. Coal Trade (million short tons)

U.S. exports are dispersed to various European and Asian countries



■ Exports ■ Imports

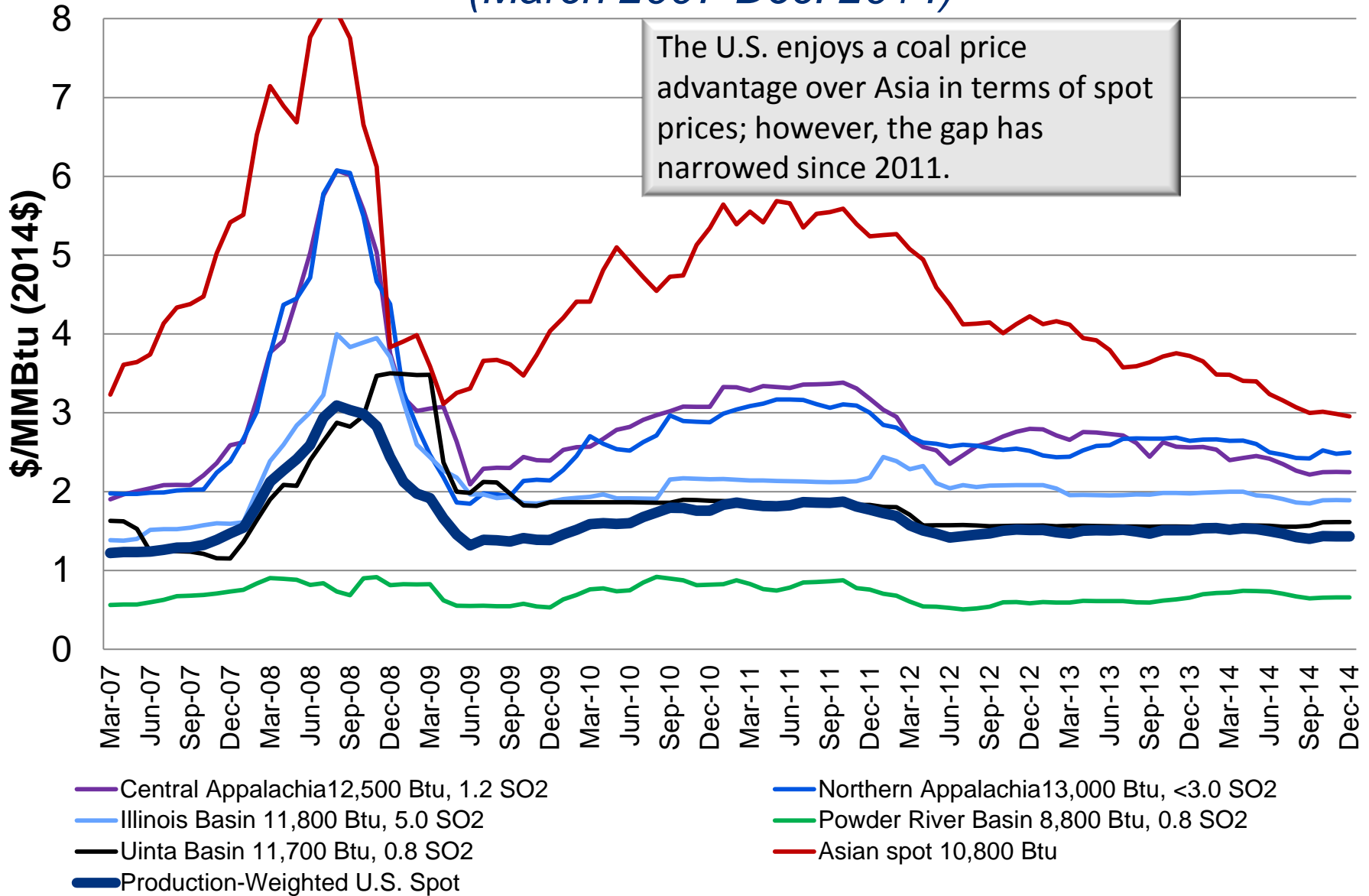


Source: EIA, Quarterly Coal Report



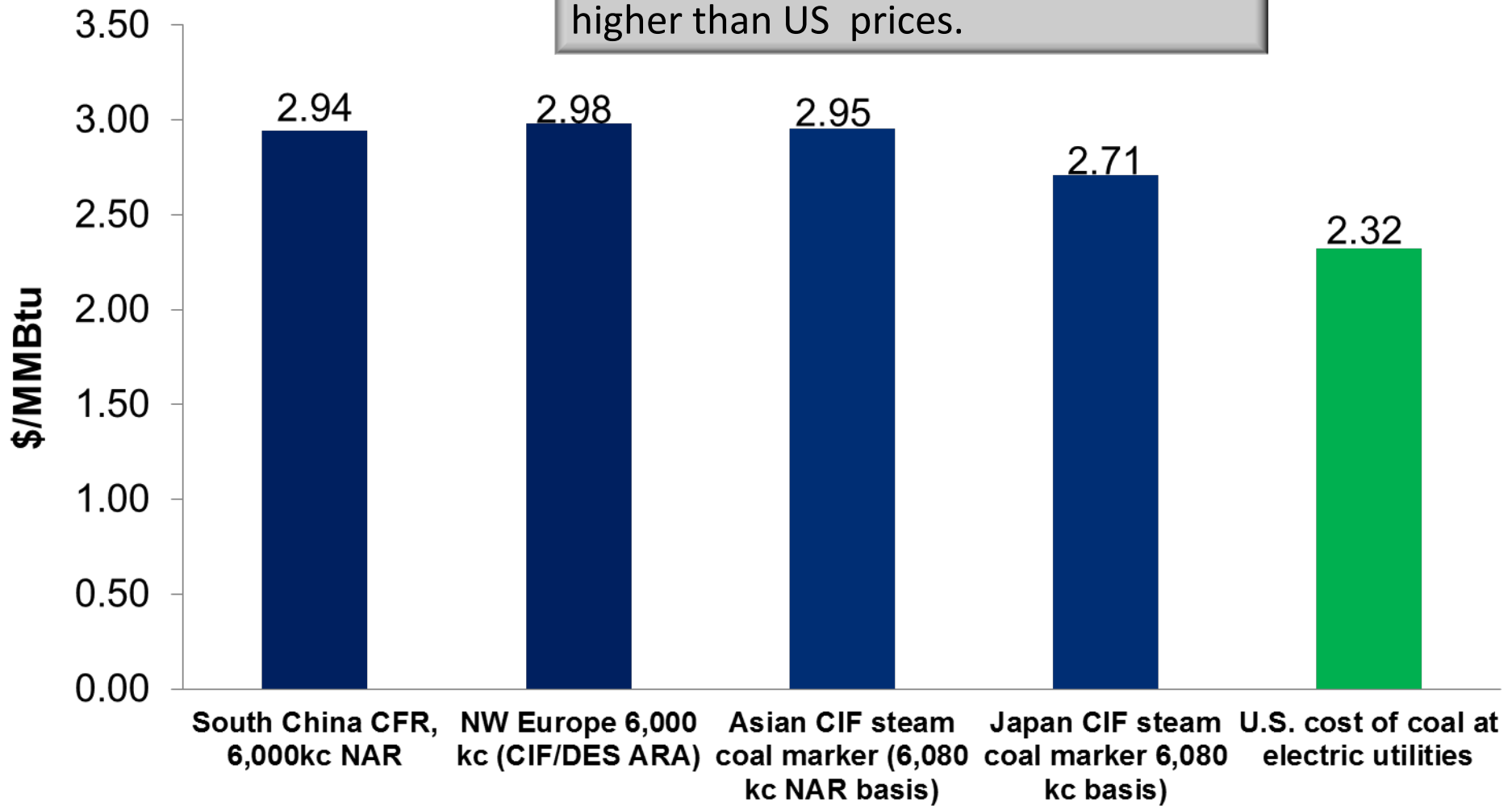
U.S./Asia Thermal Coal Spot Price Comparison

(March 2007-Dec. 2014)



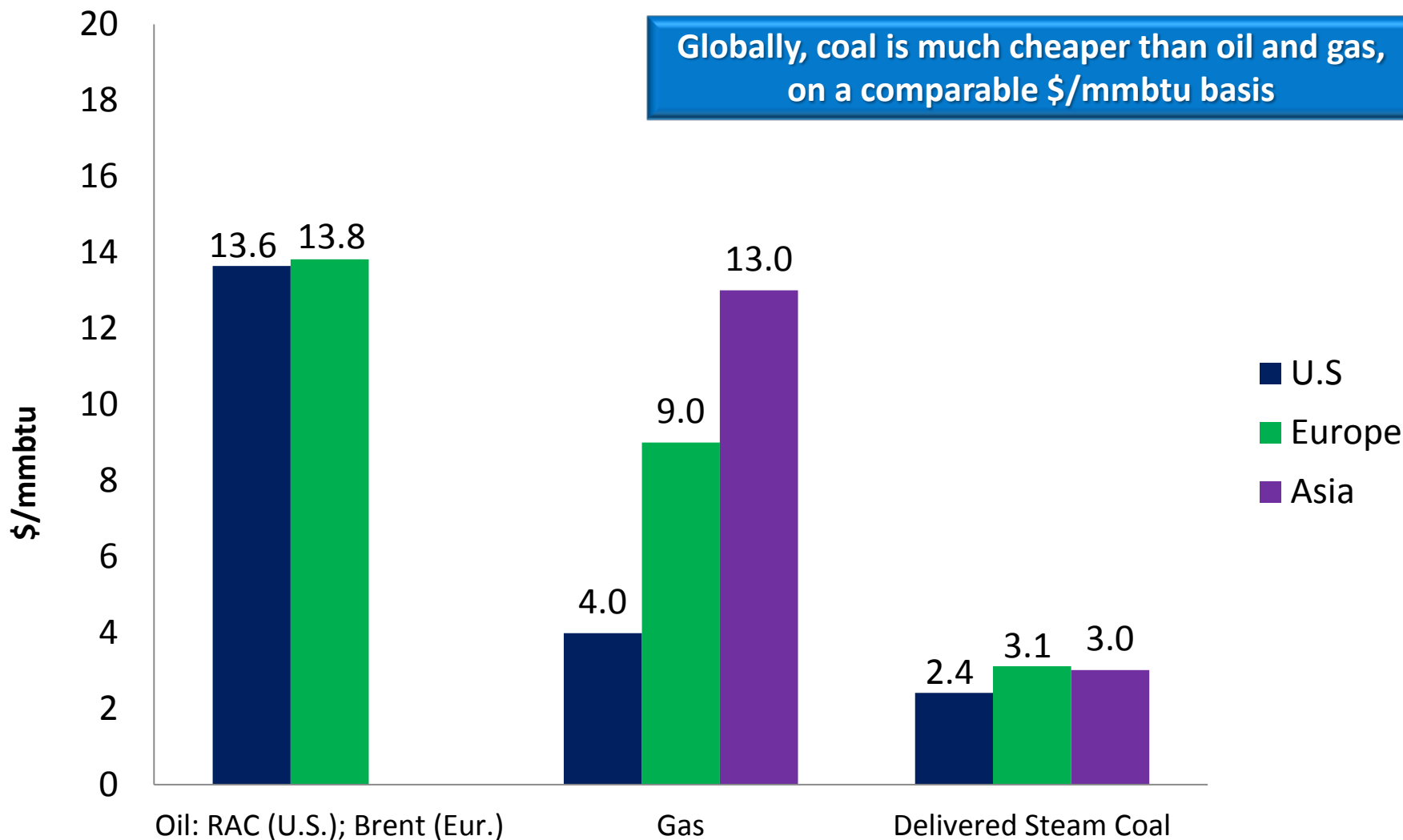
Delivered Steam Coal Prices (December 2014)

International delivered coal prices are higher than US prices.



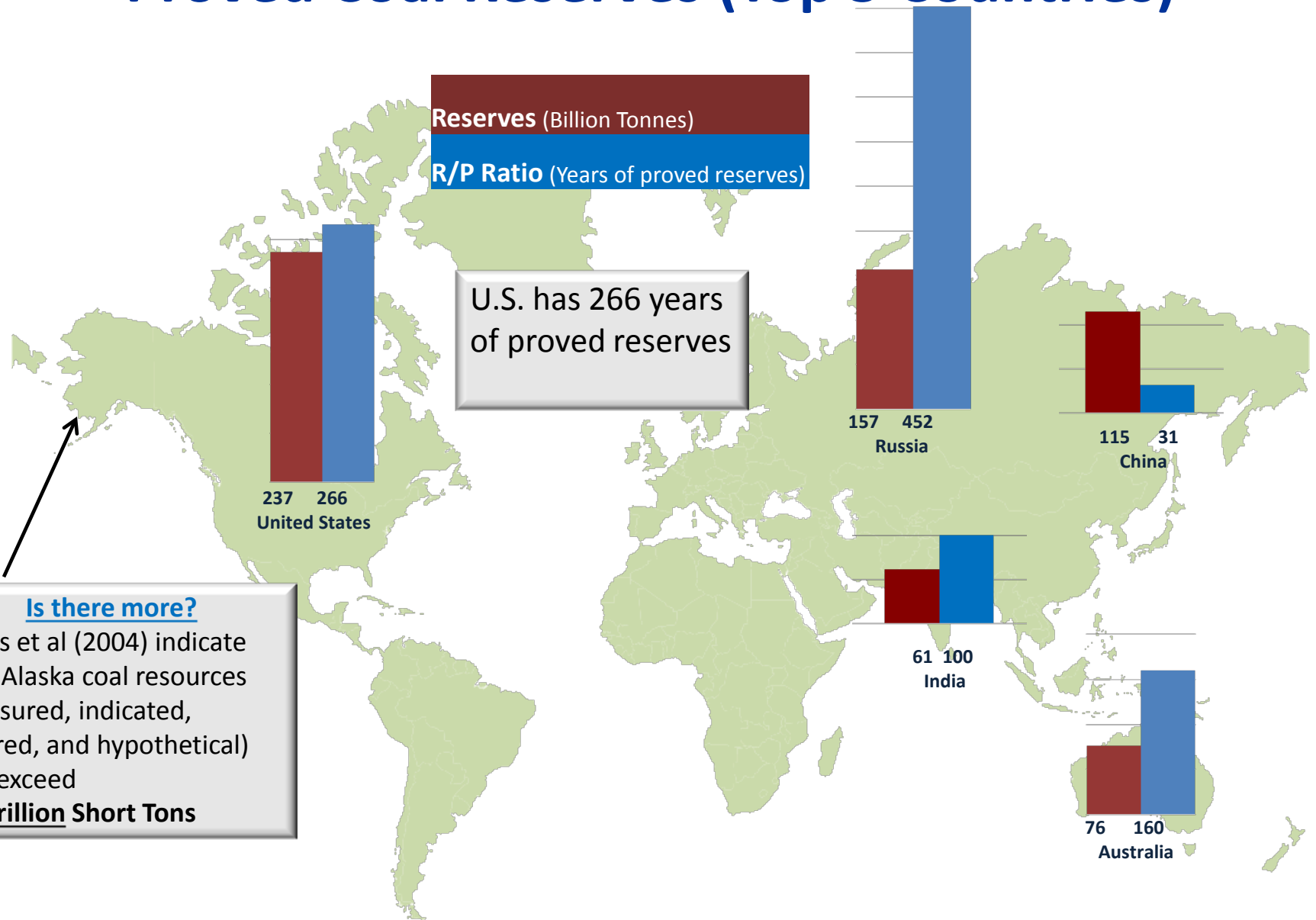
Notes: kc = kilocalorie; CFR = Cost and freight (excludes Chinese taxes); CIF = Cost, Insurance and Freight; DES = Delivered Ex Ship; ARA = Antwerp/Rotterdam/Amsterdam; NAR = Net As Received

World Energy Price Comparison (2014Q4)



**Note: Asia gas price is Japan LNG price; Europe gas price is U.K. National Balancing Point (NBP)*

Proved Coal Reserves (Top 5 Countries)



Is there more?

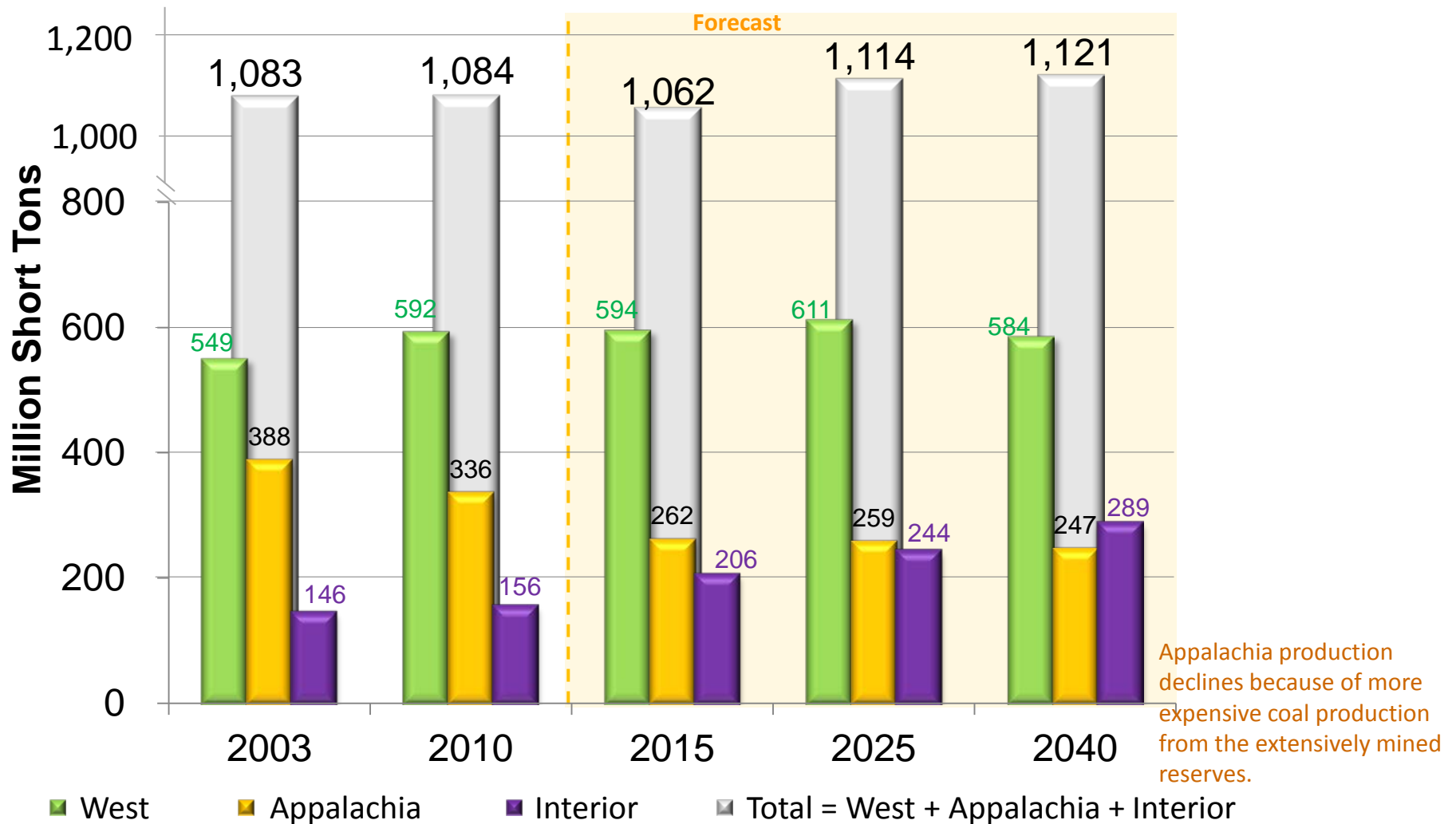
Flores et al (2004) indicate total Alaska coal resources (measured, indicated, inferred, and hypothetical) may exceed **5.5 Trillion Short Tons**

U.S. Production and Consumption

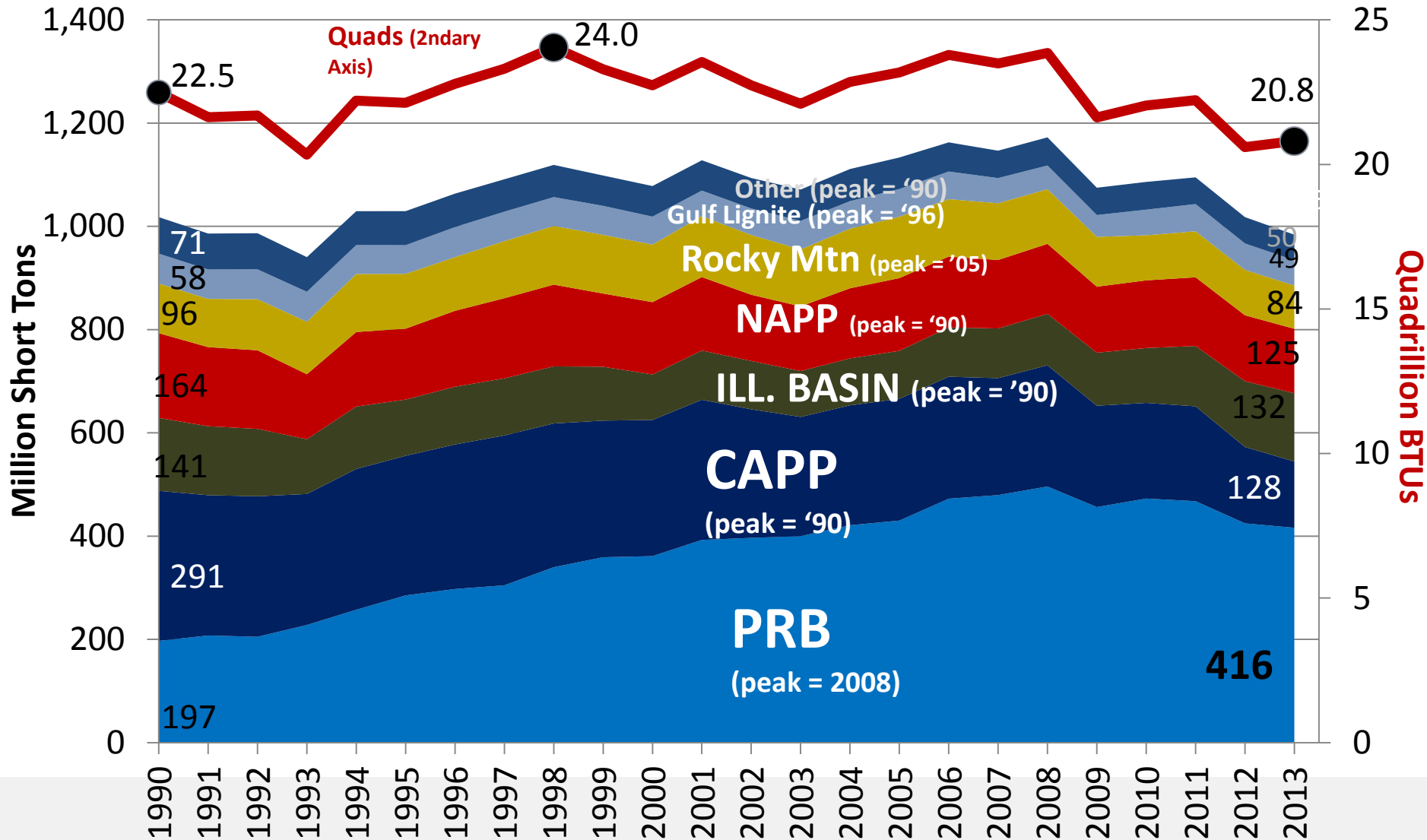
U.S. Coal Production (2003-2040)

Coal production falls due to retirement of coal-fired capacity, low natural gas prices, lack of growth in electricity demand, and increasing generation from renewables.

Coal production projected to increase due to more intensive use of remaining coal-fired capacity, and electricity demand and natural gas price increase.

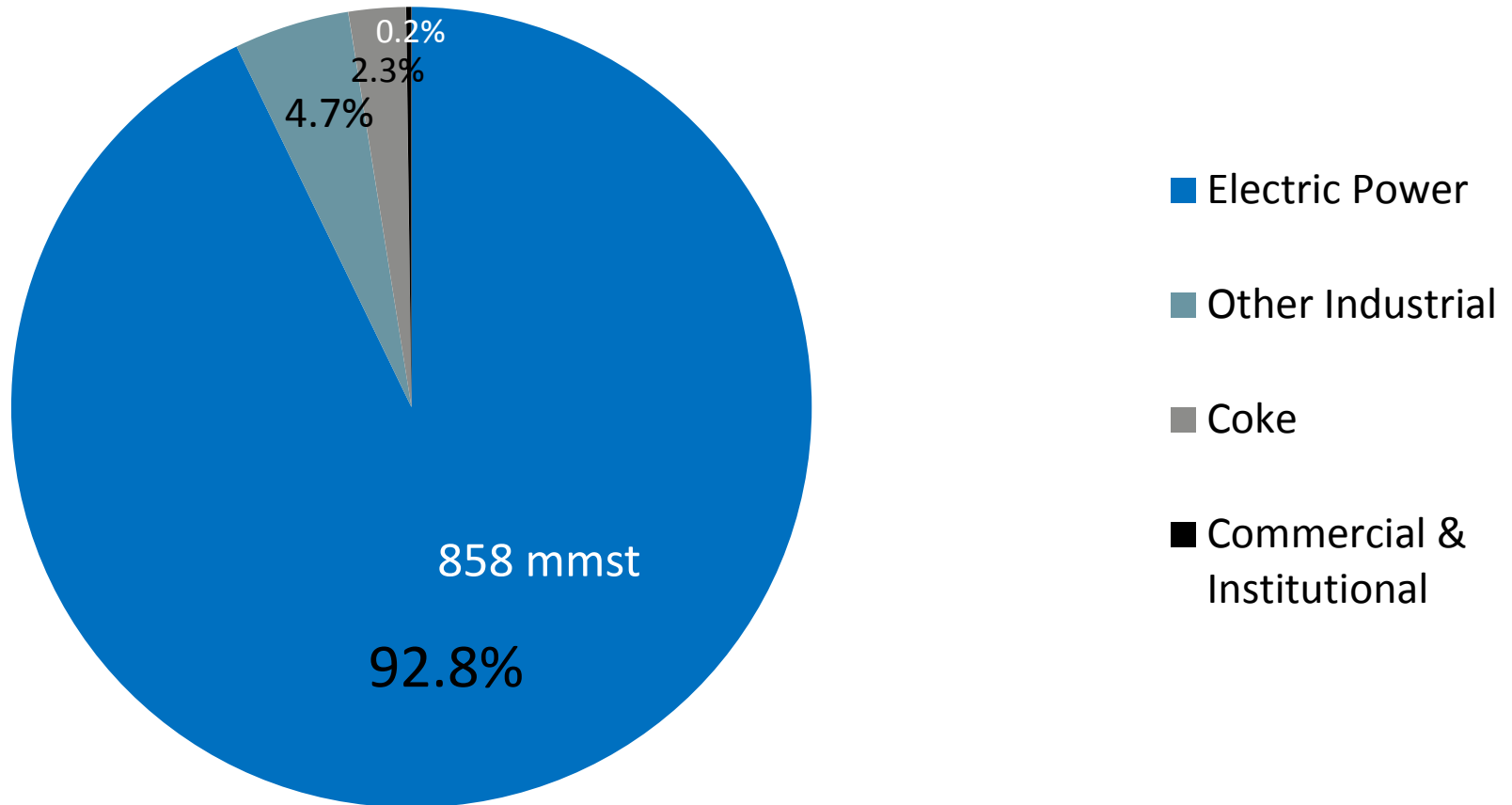


U.S. Coal Production (1990-2013)



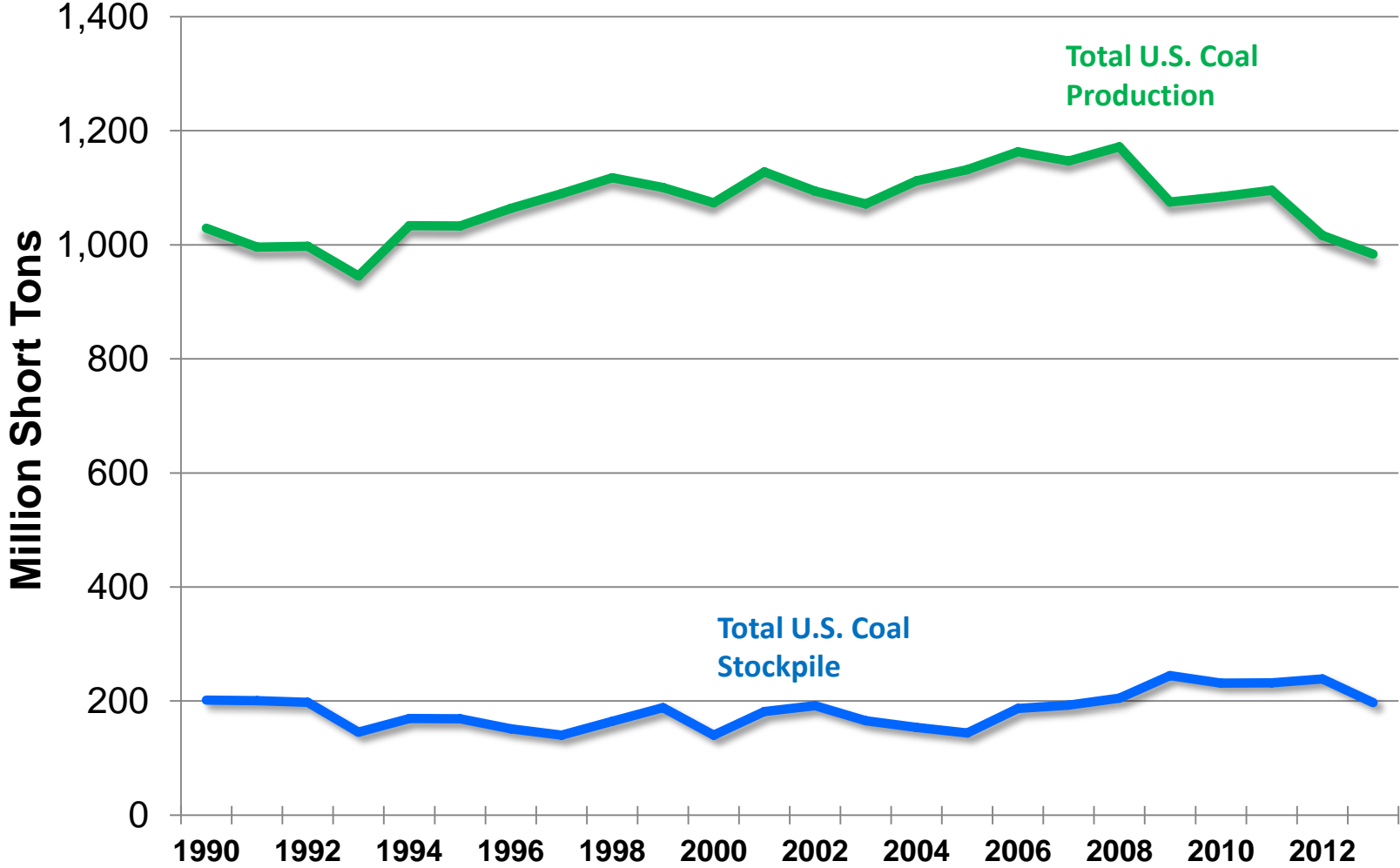
U.S. Coal Consumption, by End Use Sector (2013)

Total 2013 Consumption:
925 million short tons

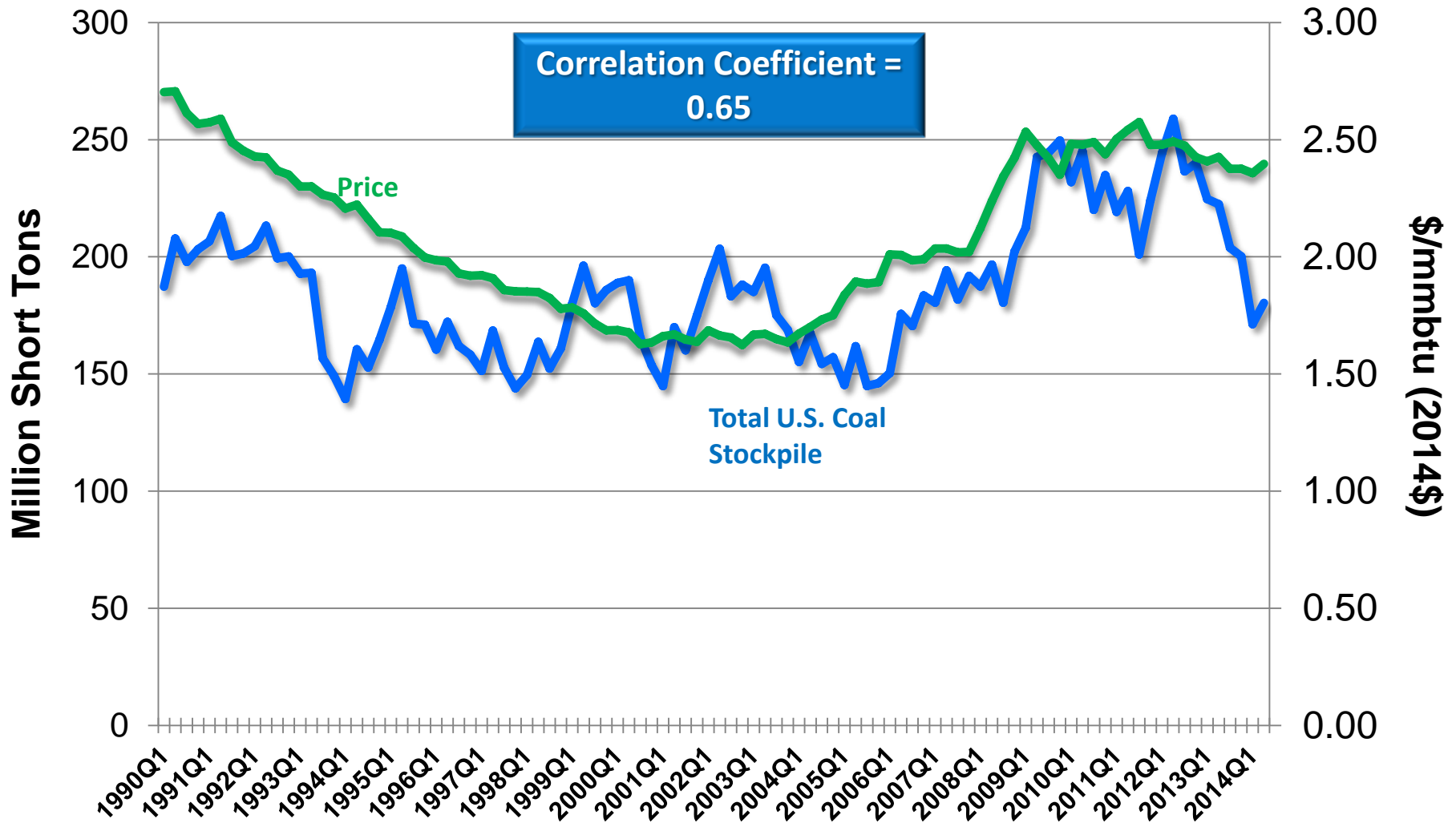


U.S. Stockpiles and Prices

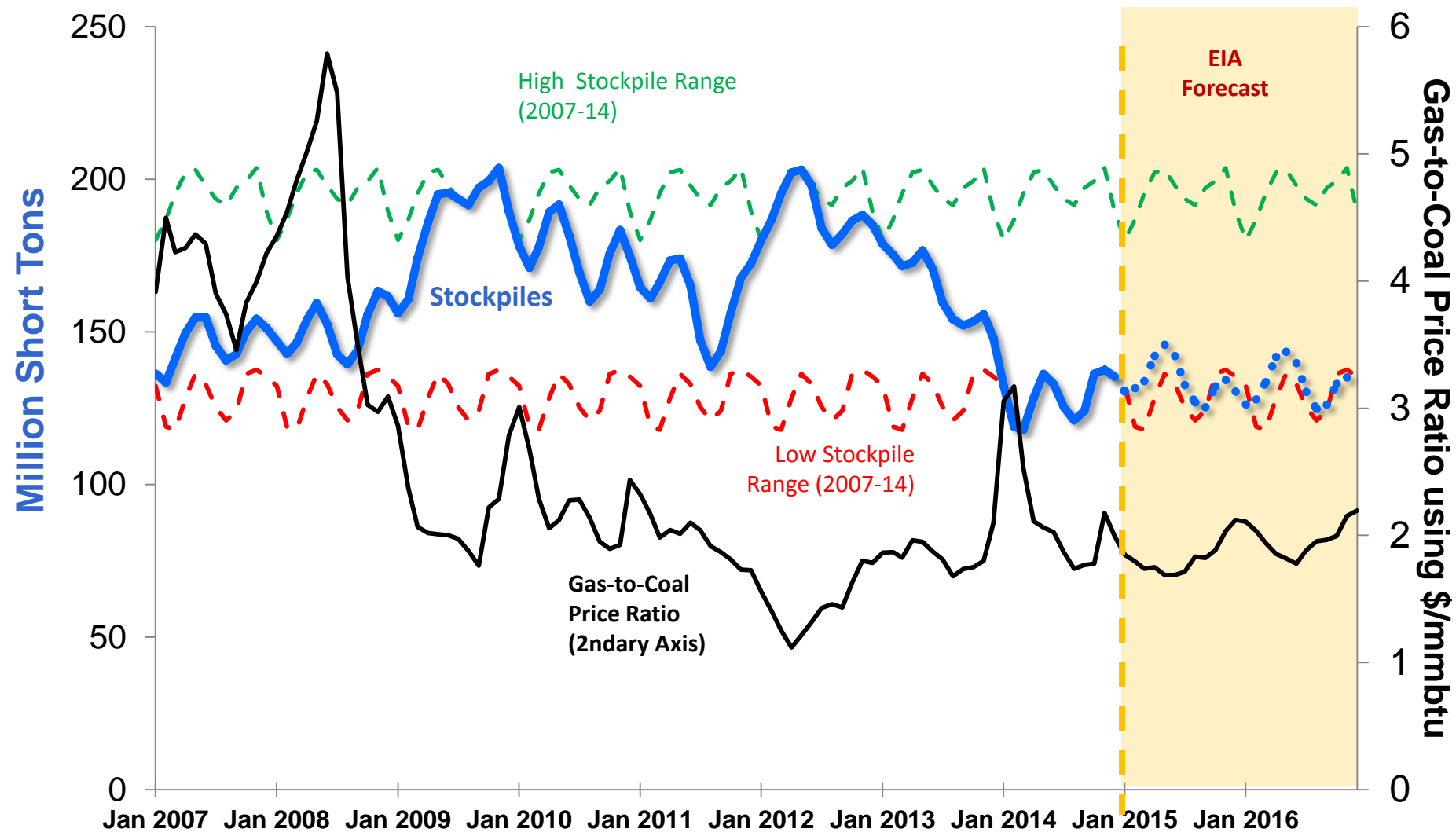
U.S. Coal Stockpiles vs. Production 1990-2013



U.S. Coal Stockpiles and Delivered Prices 1990-2014 (Quarterly)



U.S. Electric Coal Stockpiles vs. Gas-to-Coal Price Ratio

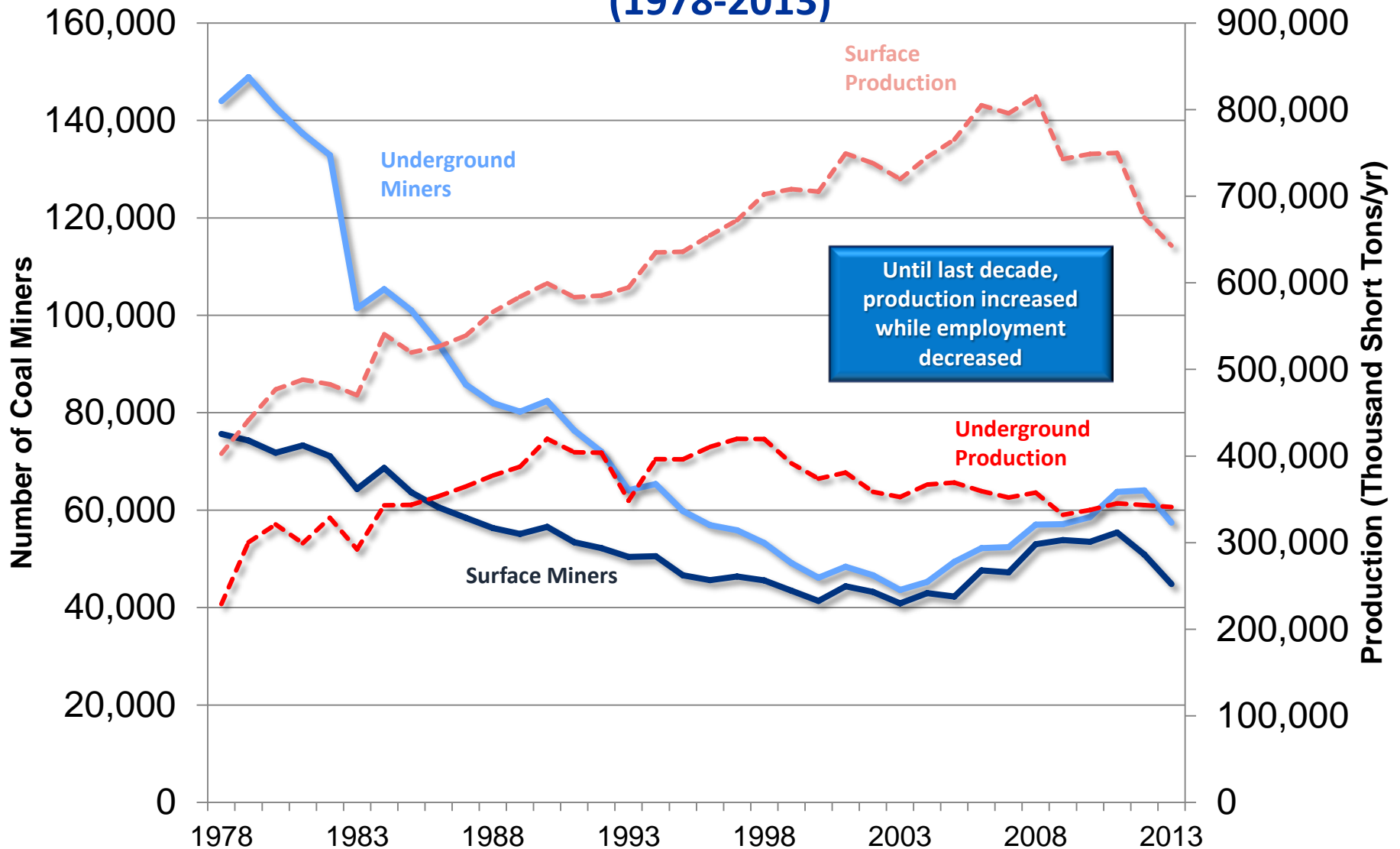


Source: EIA Short Term Energy Outlook, September 2013, Figure 22

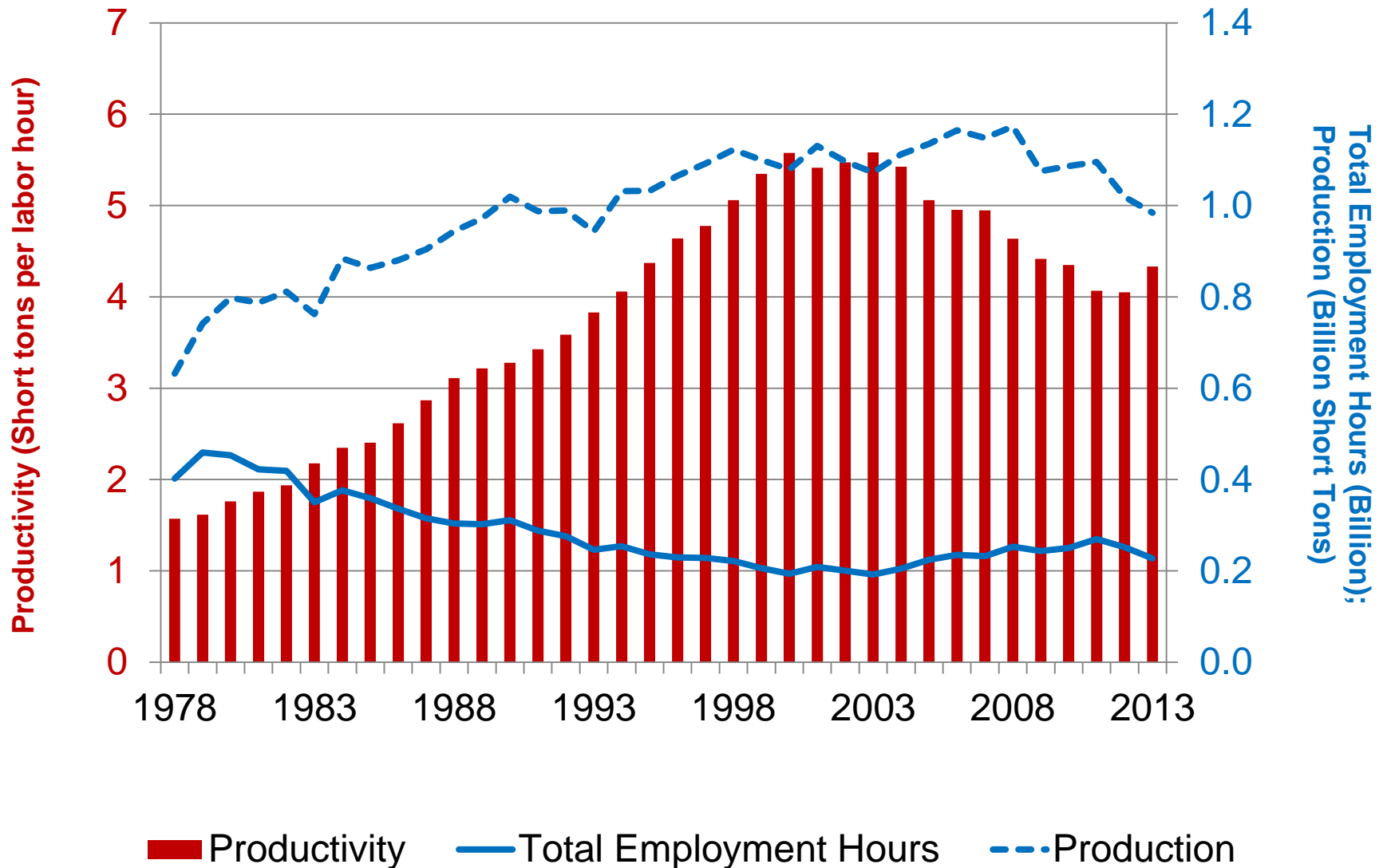


U.S. Productivity, Labor Market, Revenue, and Safety

U.S. Coal Employment and Production (1978-2013)



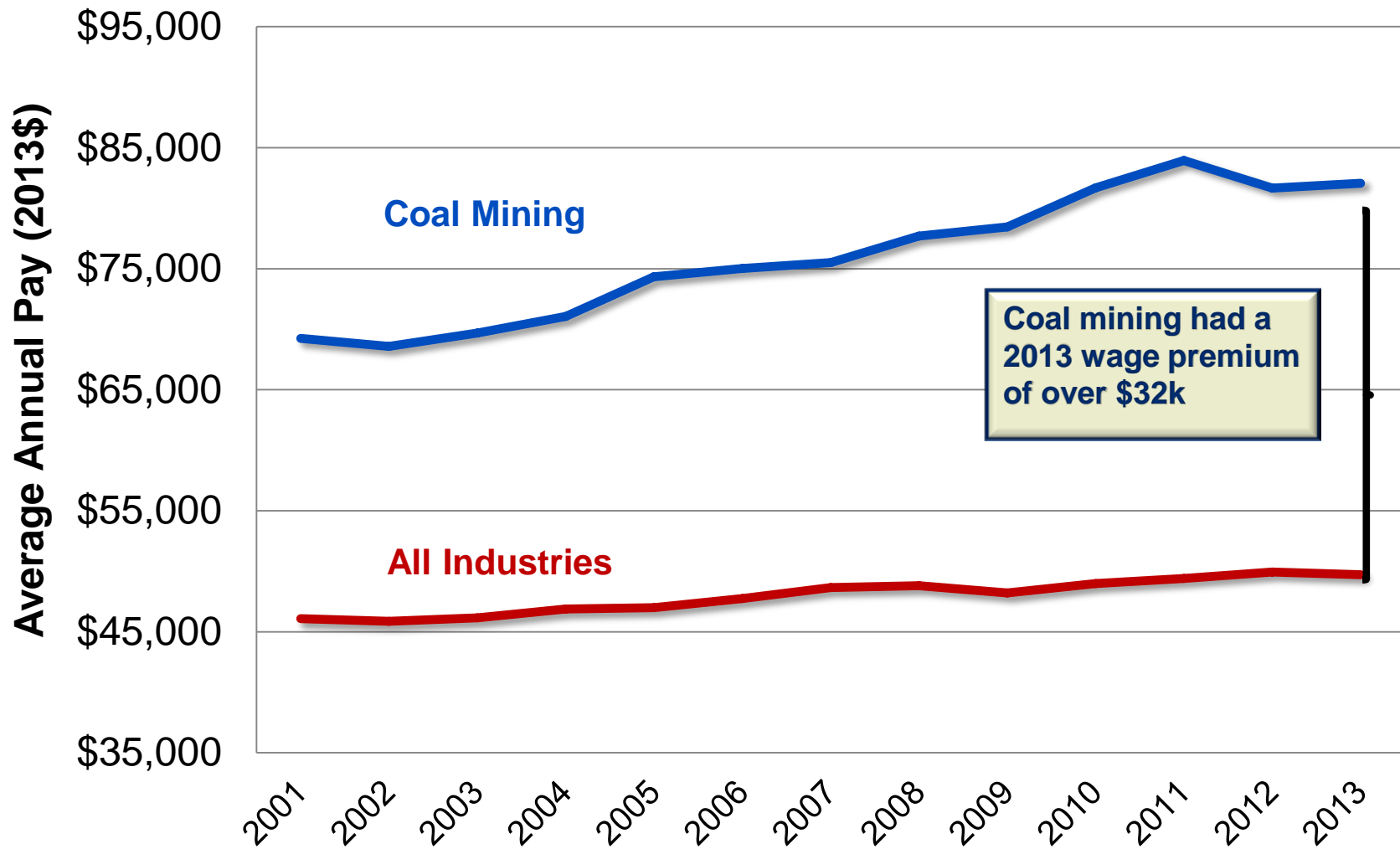
Coal Labor Productivity (1978-2013)



Source: Mine Safety and Health Administration (MSHA): Historical Data Table 4 and Injury and work time data; Mine Injury and Worktime Reports 2009 through 2013: Tables 1 and 5. (Includes operator and contractor data, as well as mining; independent shops; prep plants; and office workers.)

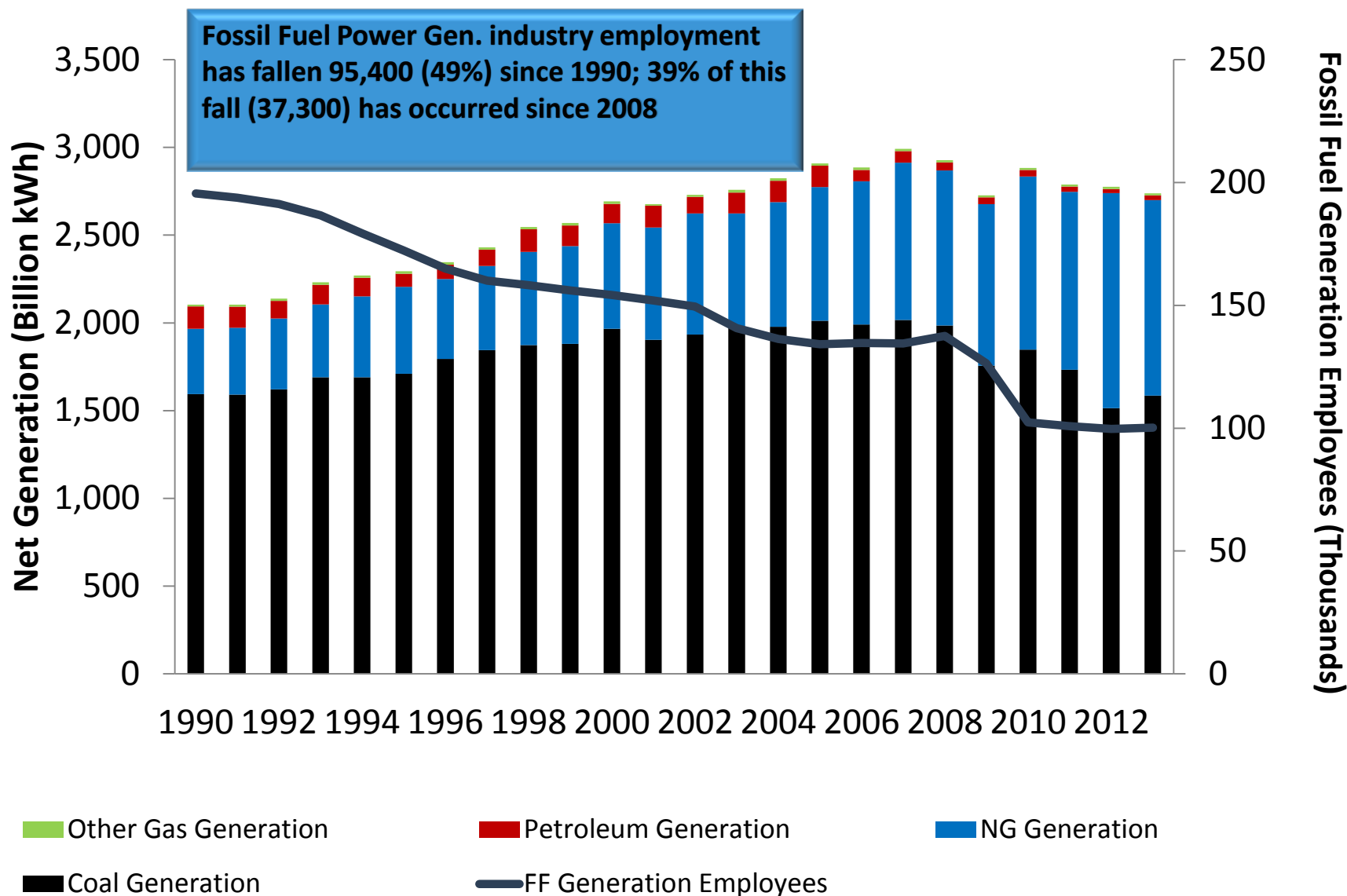


Coal Mining* Pay Versus Other Industries (2001-2013)

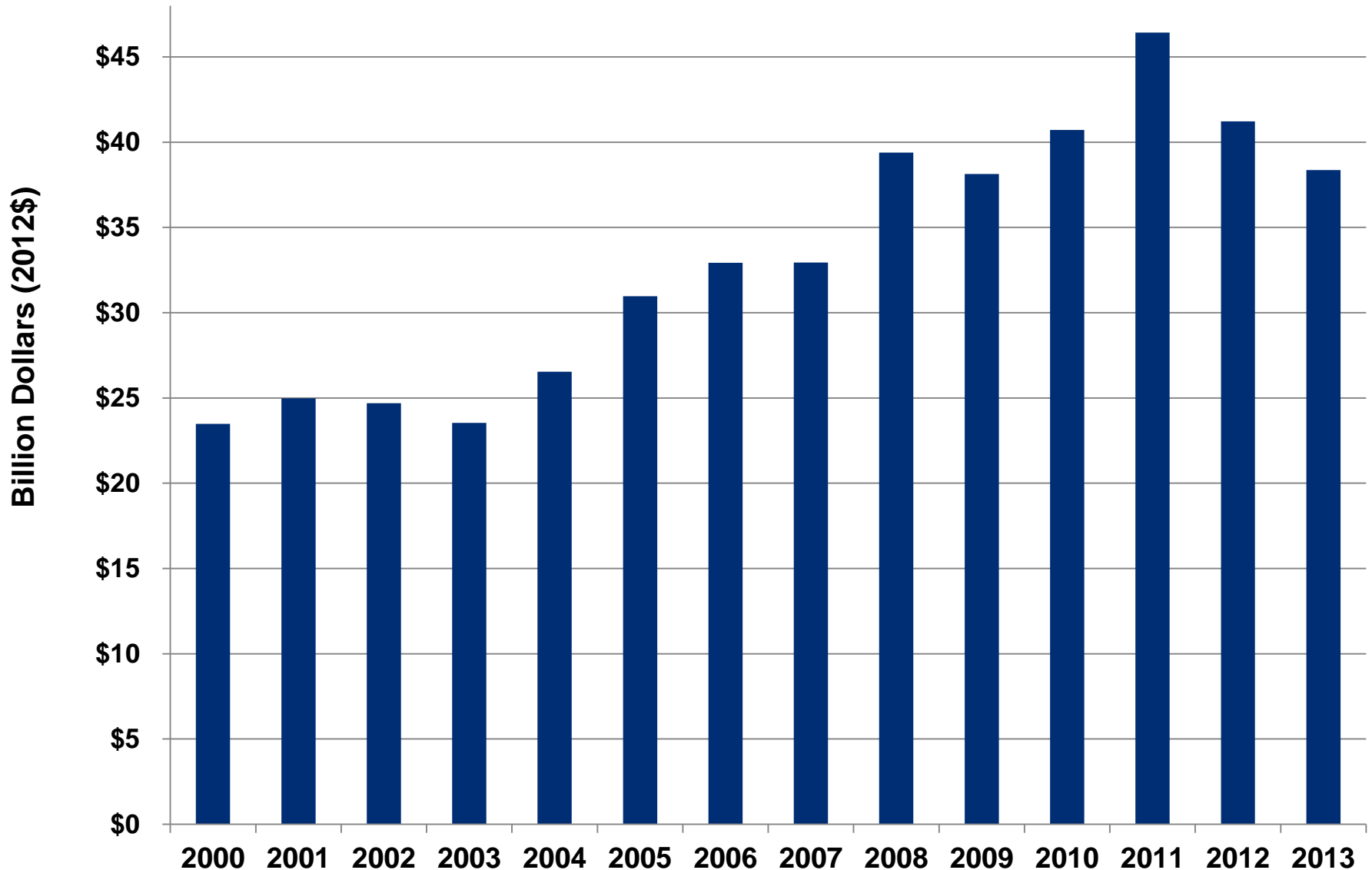


*NAICS 2121 Coal Mining

Fossil Fuel Power Generation and Employment (1990-2013)



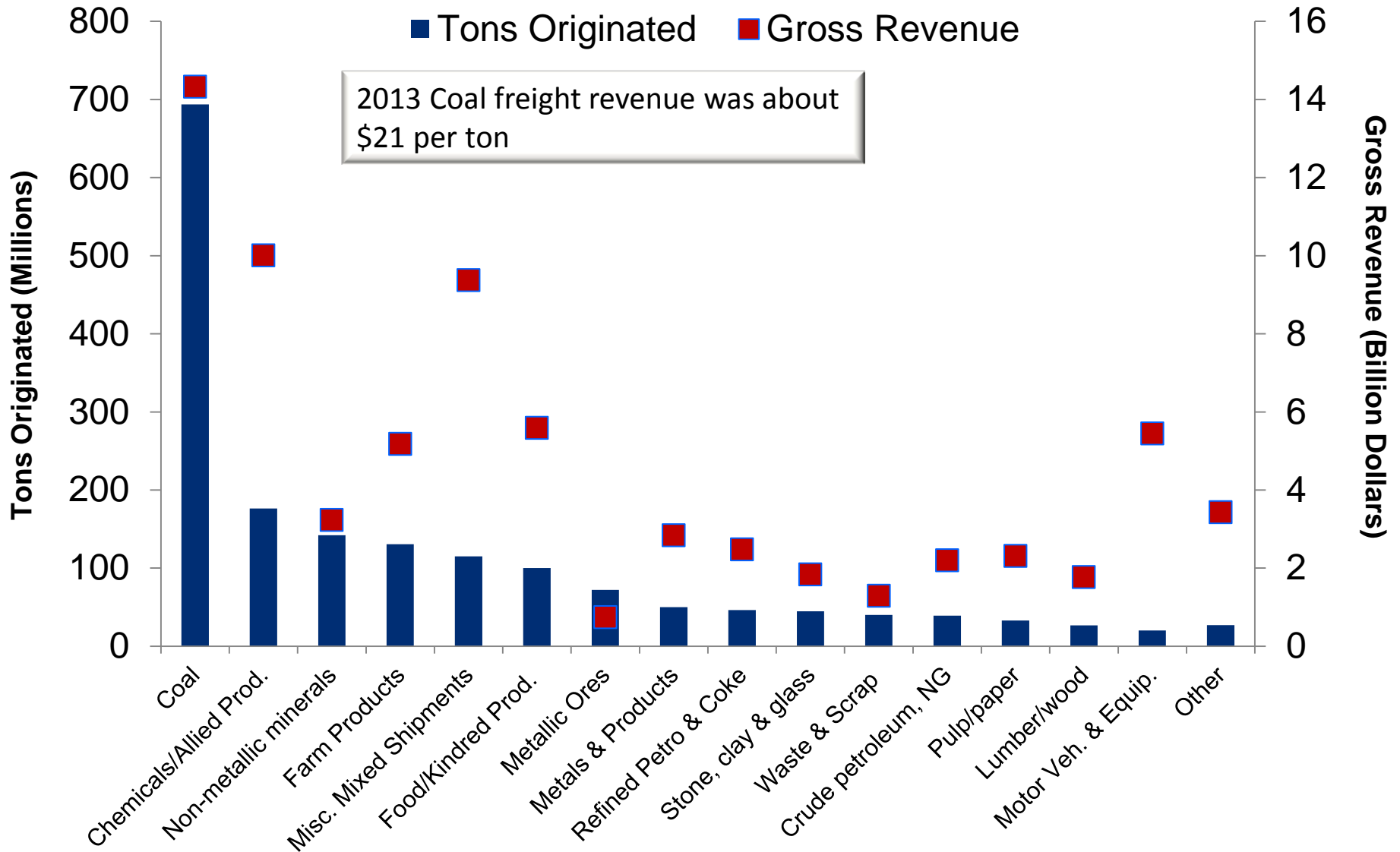
Total U.S. Coal Mining Revenue



Sources: EIA, Monthly Energy Review; National Mining Association (for 2013 average sales price); Census (accessed from FRED database); revenue estimated by multiplying average coal price by total number of tons produced

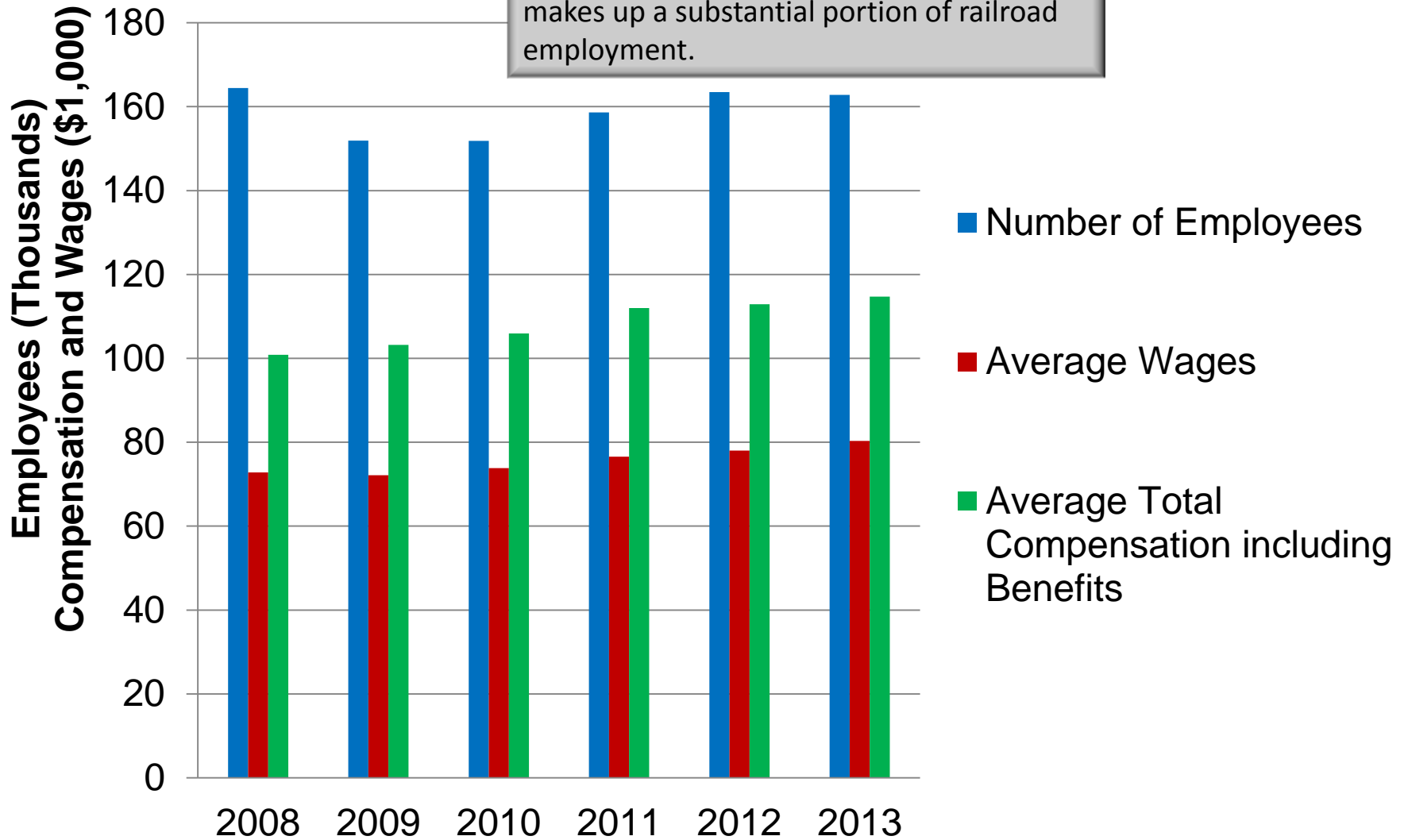


U.S. Class I Railroad Tons Originated & Revenue (2013)

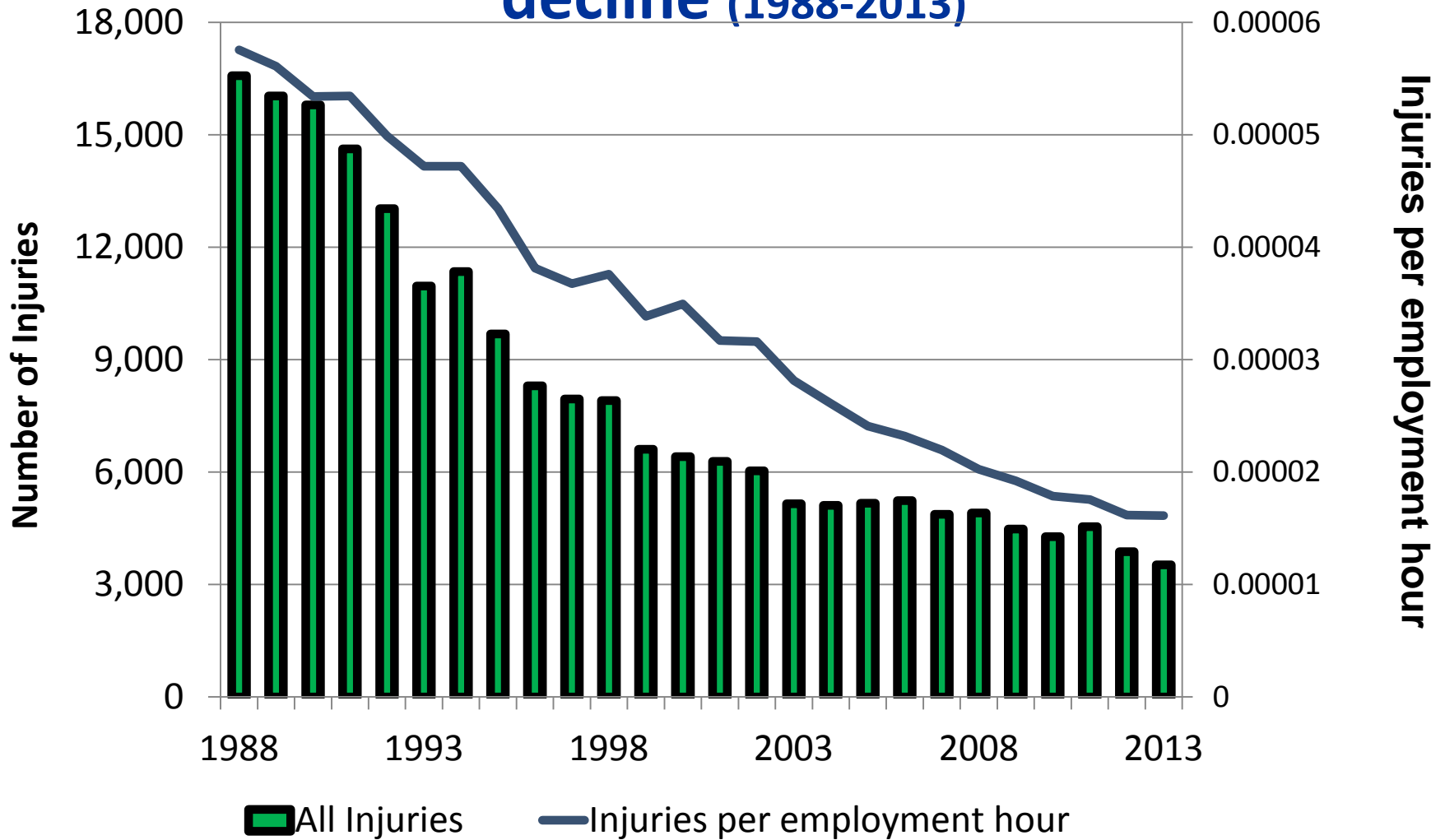


U.S. Class I Railroad Employment and Wages

Coal accounted for 36.2 percent of U.S. Railroad ton-miles in 2012*, suggesting coal makes up a substantial portion of railroad employment.



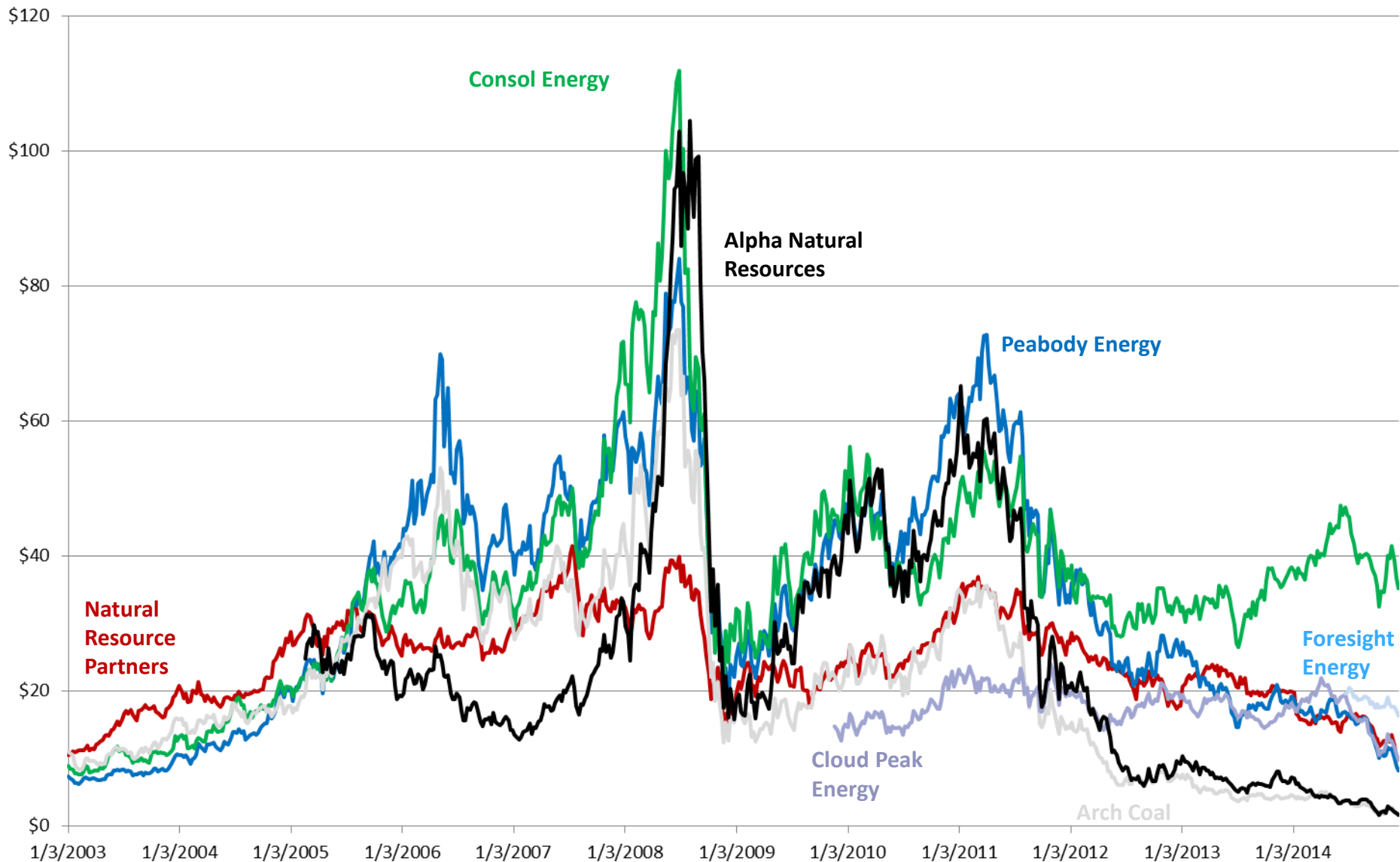
Mining Industry (non-office) Injuries* on the decline (1988-2013)



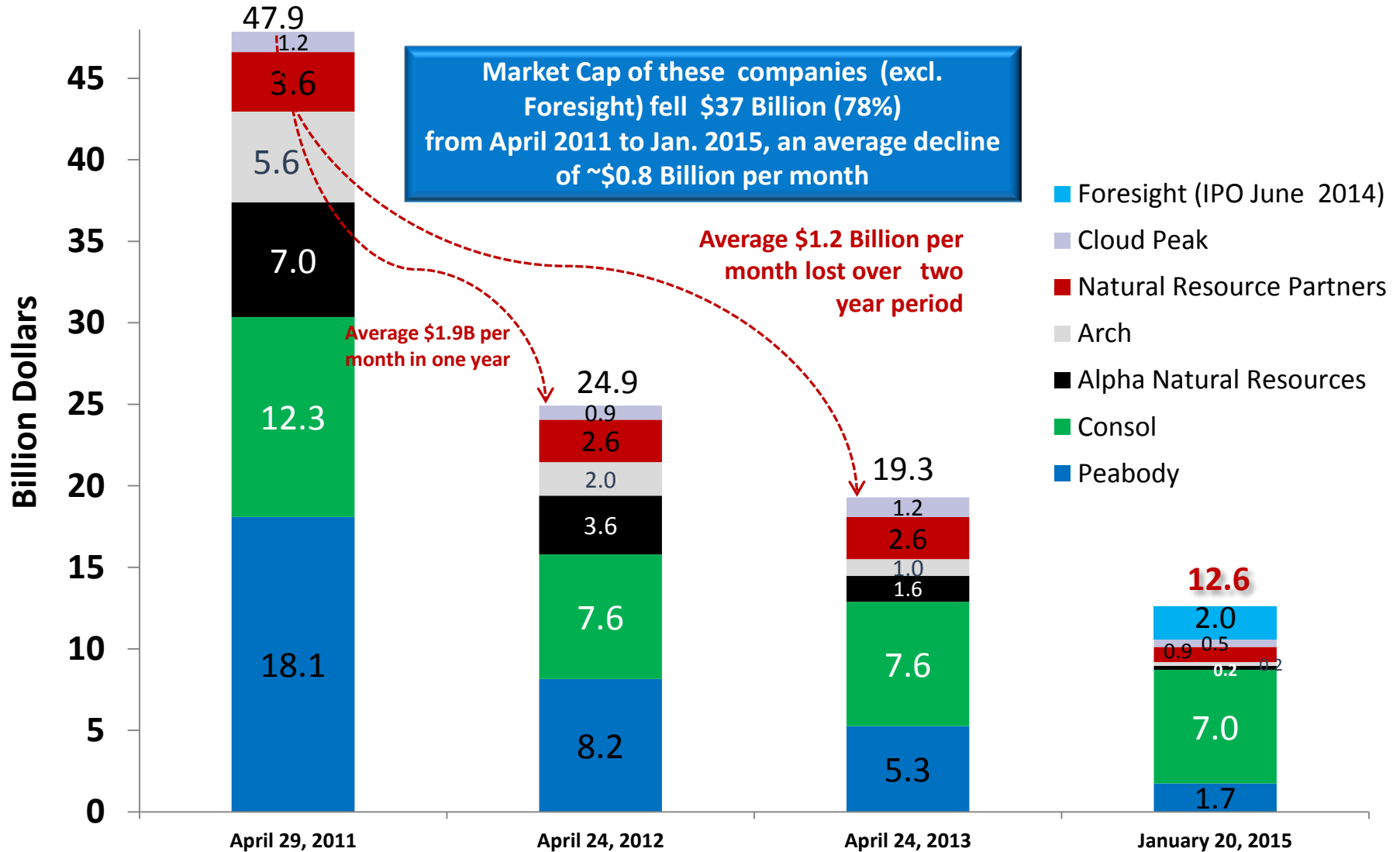
*Number of injuries includes mining, indp shops/prep plants for operators and contractors

U.S. Company Market Strength

Select Coal Company Stock Prices (Weekly)



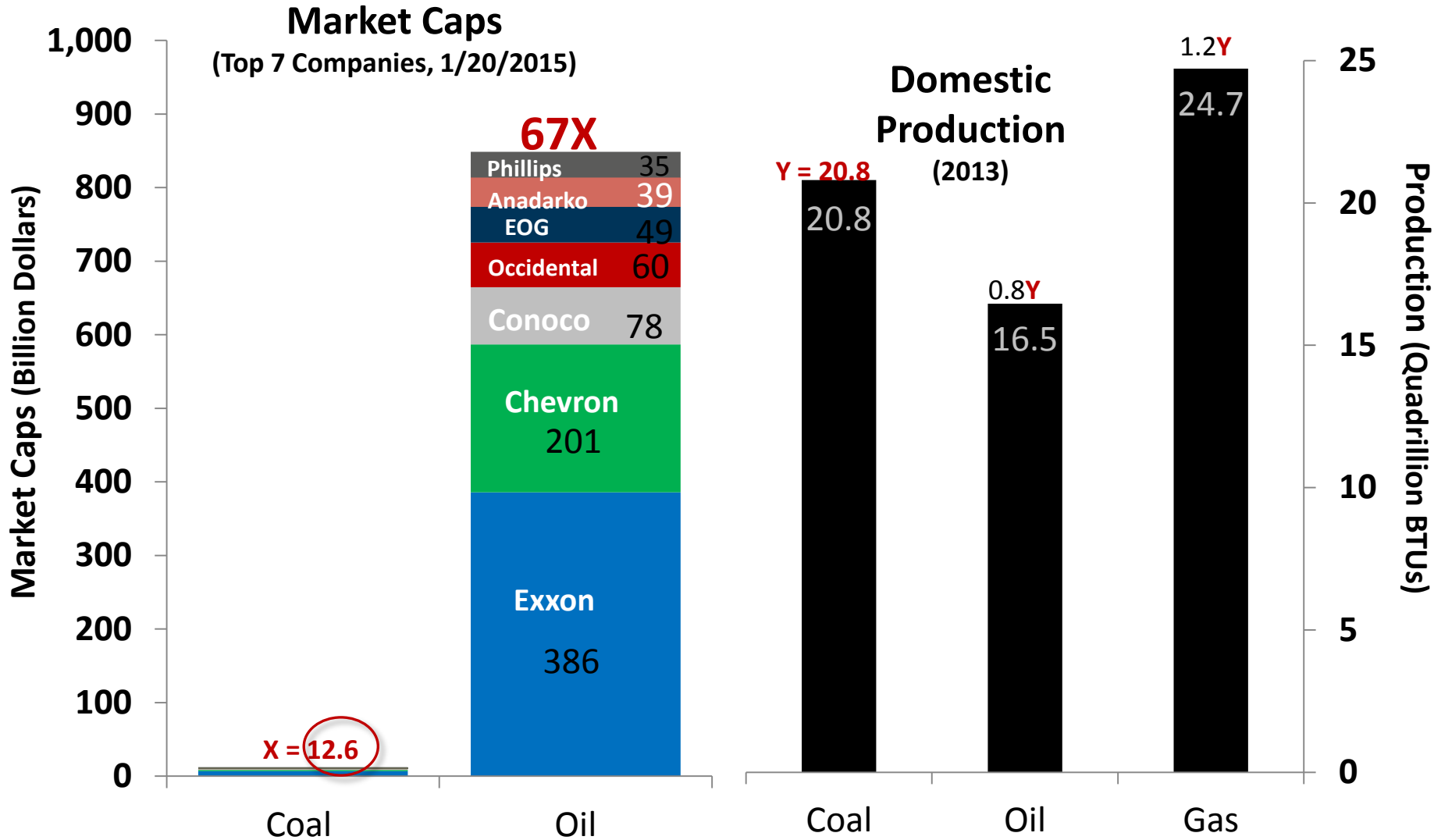
U.S. Coal Company Market Capitalization



Source: Ycharts. Note: totals may not sum due to rounding; market capitalization is the share price multiplied by the number of outstanding shares



“Big” Coal vs. Big Oil Market Caps & Domestic Production



Top U.S. Oil companies have 67 times the market cap of large U.S. Coal companies; however, total U.S. oil production is only 79% the size of U.S. coal production, on an equivalent energy basis

Conclusions

Key Takeaways

- **Delivered coal prices are lower in U.S. than other countries; however, this gap has narrowed in recent years.**
- **The increase in world coal consumption through 2040 is projected to be driven by non-OECD countries, which account for all of the increase (WEO'14)**
- **Forecasted U.S. Coal Production increase of 99 million tons from 2013 to 2040 due to higher utilization rate, as well as increased net exports (+54 mmst)**
- **U.S. proved coal reserves estimate: 266 years, at current production levels**
 - **If 10% of Alaska's hypothetical reserves end up becoming proved reserves, total proved reserves would triple**
 - **Coal responsible for 36% of U.S. railroad ton-miles**
- **Mining labor productivity improved from 1980-2000, then declined**

Key Takeaways (Continued)

- **Wages**
 - Fossil fuel power plant employees make ~\$54,000 more/year than the national average
 - Coal mining employees earn ~\$32,000 more/year than the national average
- Mining industry injuries declined ~80% from 1988 to 2013
- Energy from domestic coal production contributes 26% more energy (mmbtu) than domestic oil production
- Wall Street view of coal and willingness to carry coal is shown in the disconnect between production and market capitalization
- From April 2011 to January 2015, the market capitalization of the top U.S. coal companies fell 78% and experienced a loss of \$0.8 Billion per month in market cap