

Energy Security Fact Pack

Q4 2016



Securing America's
Future Energy



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#SAFEenergyfacts

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SAFE's Energy Security Fact Pack provides a data-driven overview of the latest trends in U.S. energy security, including domestic and global oil production and consumption, oil market dynamics, energy prices, consumer spending on oil, fuel efficiency, and alternative fuel vehicles.

Q4 2016: Harnessing American Energy and Innovation

- The past two years have tested the resiliency of the American oil industry. OPEC's November 2014 decision to protect market share helped crash global prices and eliminate more than 200,000 American jobs in a then-thriving energy sector [Page 6]. U.S. oil production fell 0.5 million barrels per day (mbd) year-over-year (y-o-y) in 2016 as the rig count dropped by more than 80% [Page 10].
- OPEC and its partners control the vast majority of global oil reserves, and has used its immense market power to dictate terms. Recent y-o-y declines in U.S. oil production coincide with rising OPEC supply, the result of a strategy to undercut higher cost production and undermine investment decisions [Pages 5 & 16].
- However, the American oil industry has adapted, targeting the most oil-rich opportunities and reducing costs. Despite relatively low oil prices, U.S. crude oil production increased in Q4 (its first quarterly increase since Q1 2015) and is forecast to rise further in 2017 [Pages 10 & 11]. Rebounding industry activity will bring jobs back to the sector.
- The transportation sector also promises opportunities for job creation and strengthening of U.S. energy security. Sales of plug-in electric vehicles (PEVs) reached historic highs in Q4, propelled in part by a wider selection of new vehicle models [Page 32]. U.S.-based manufacturing of PEV and autonomous vehicle technology is expected to grow significantly. Both will help improve transportation sector efficiency and reduce oil intensity, protecting the United States against severe oil price volatility and OPEC's actions [Pages 7 & 26].

The Q4 2016 Fact Pack includes a 'Charts of the Quarter' section focused on OPEC reserves and production, U.S. oil and gas sector employment, and the potential for job creation from U.S. oil production and electric vehicle manufacturing.



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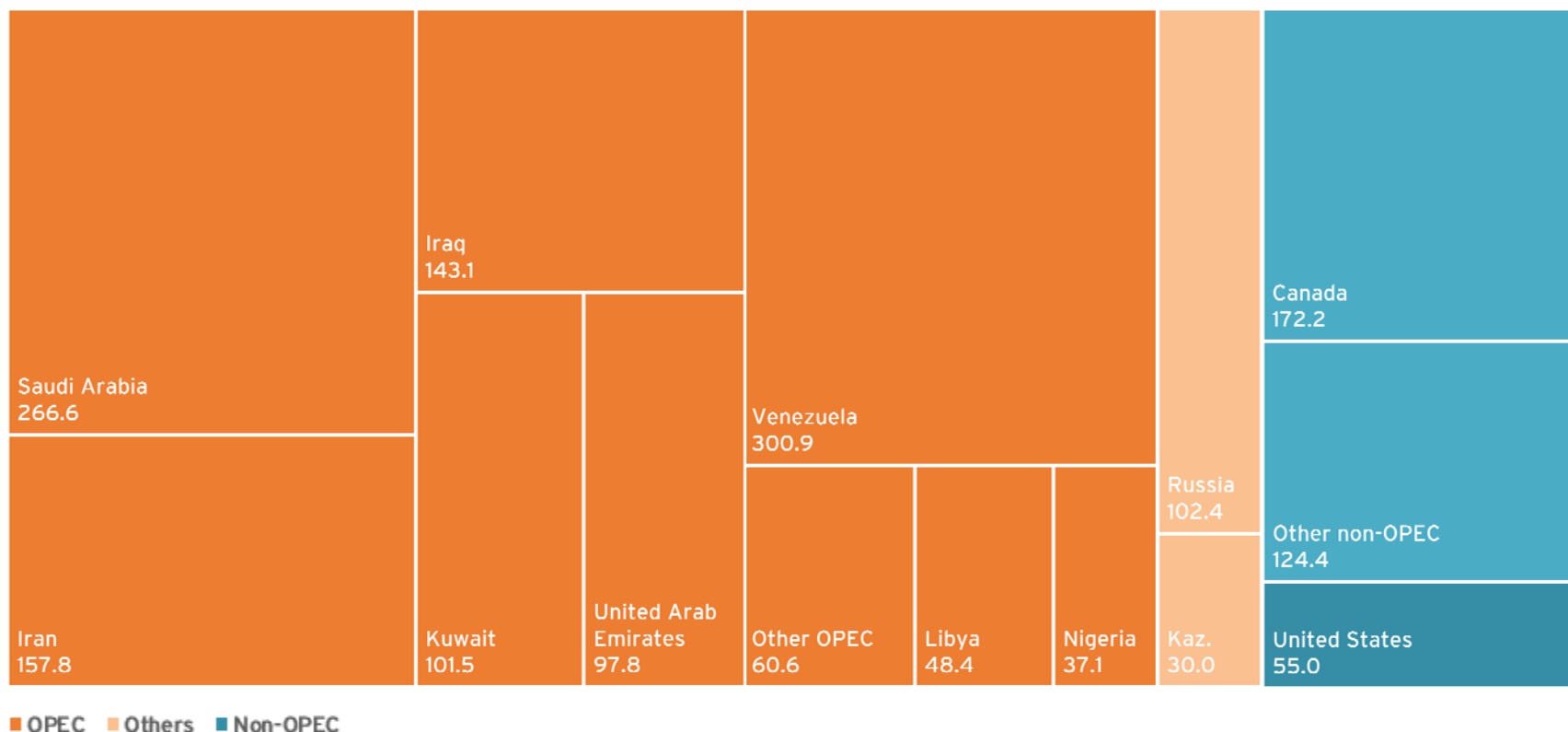
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OPEC Controls Bulk of Global Oil Reserves

OPEC control roughly 72% of the world's 1.69 billion barrels of proved oil reserves. A large portion of these resources are held by Venezuela and Saudi Arabia (301 billion barrels and 267 billion barrels, respectively). The United States holds 55 billion barrels (3%).



Note: Reserves indicated in billion barrels. Kaz. = Kazakhstan.

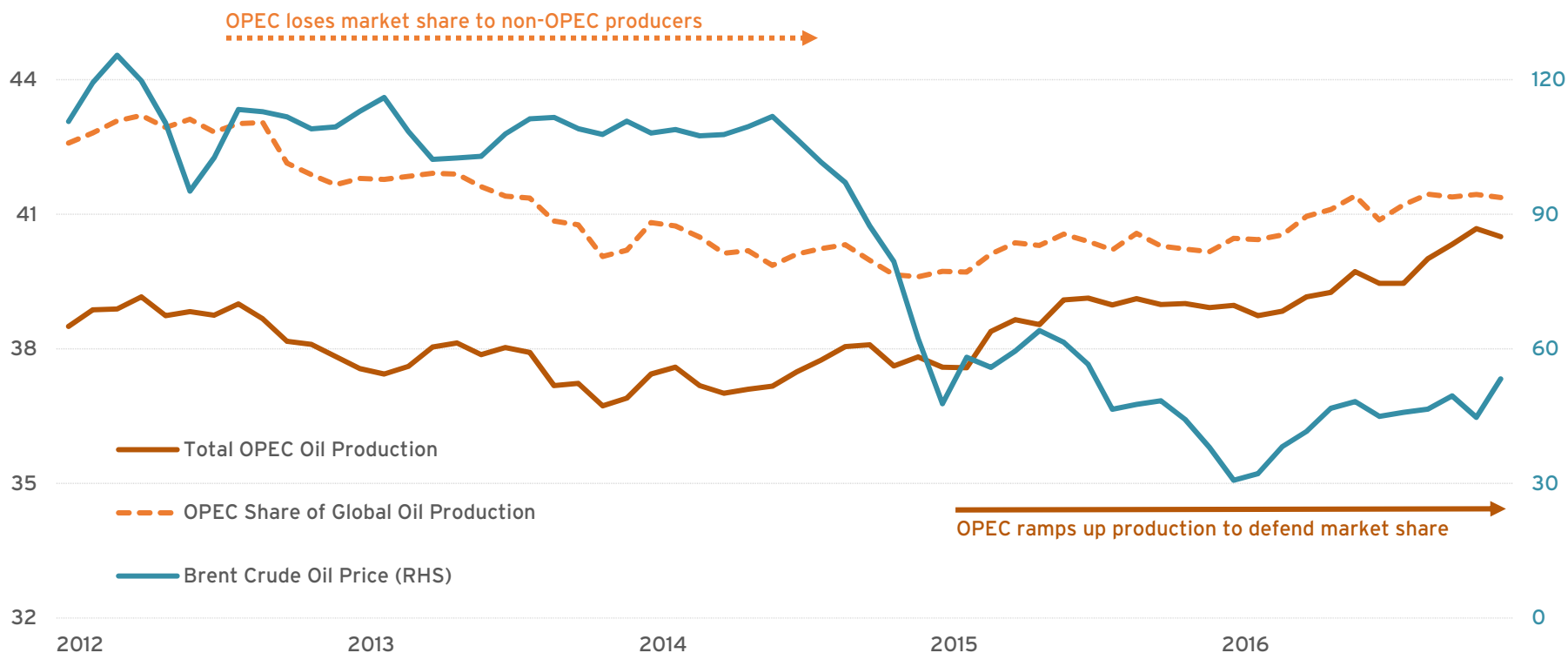
Source: BP

OPEC Power Influences Markets

OPEC uses its immense reserves to defend market share, choosing to boost production in order to drive down global oil prices in late 2014. Between September 2014 and September 2016, OPEC output grew approximately 2 mbd, giving OPEC more than 1% additional market share.

47 Million Barrels per Day or Share (Percent)

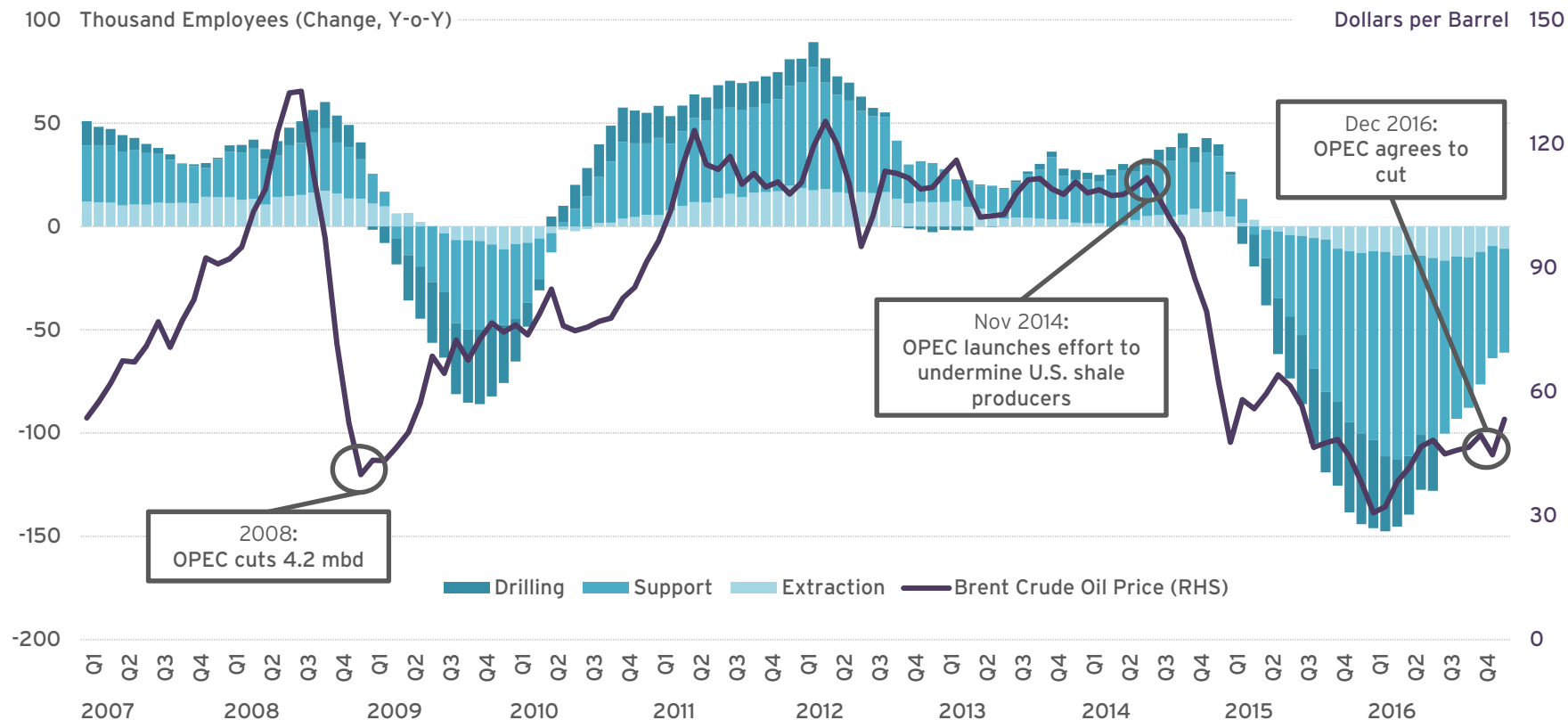
Dollars per Barrel 150



Source: SAFE analysis based on data from EIA

U.S. Oil Employment Shrinks Under OPEC Policies

Oil sector employment is closely linked to oil production levels and oil prices. Between September 2014 and June 2016, roughly one third (or 212,000) of U.S. oil and natural gas industry jobs were lost as low oil prices affected activity and production declined.

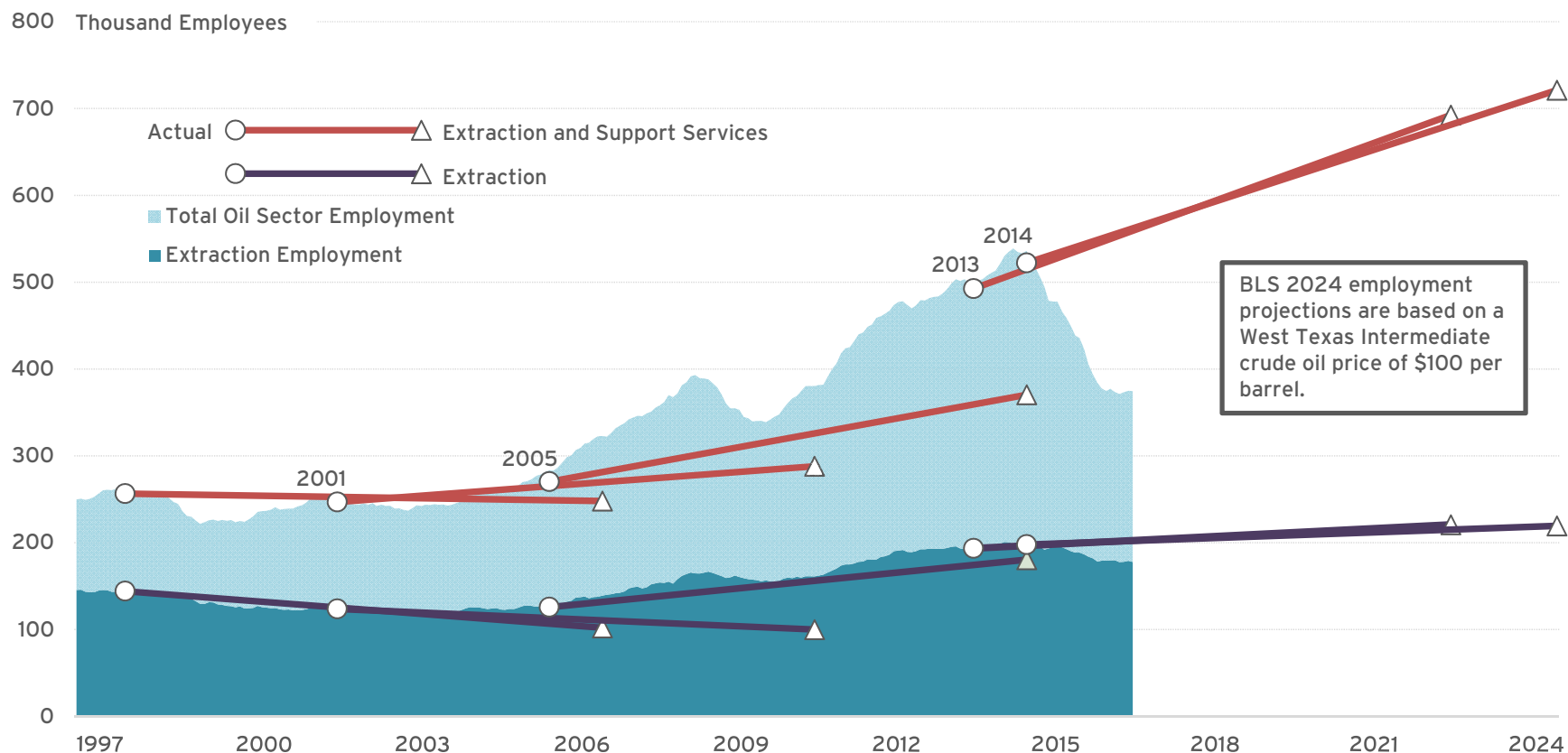


Note: Support and Extraction data points for December 2016 are preliminary. Drilling data is only available through June 2016.

Source: SAFE analysis based on data from Bureau of Labor Statistics and EIA

Shale Oil Revolution Drives U.S. Oil Sector Job Growth

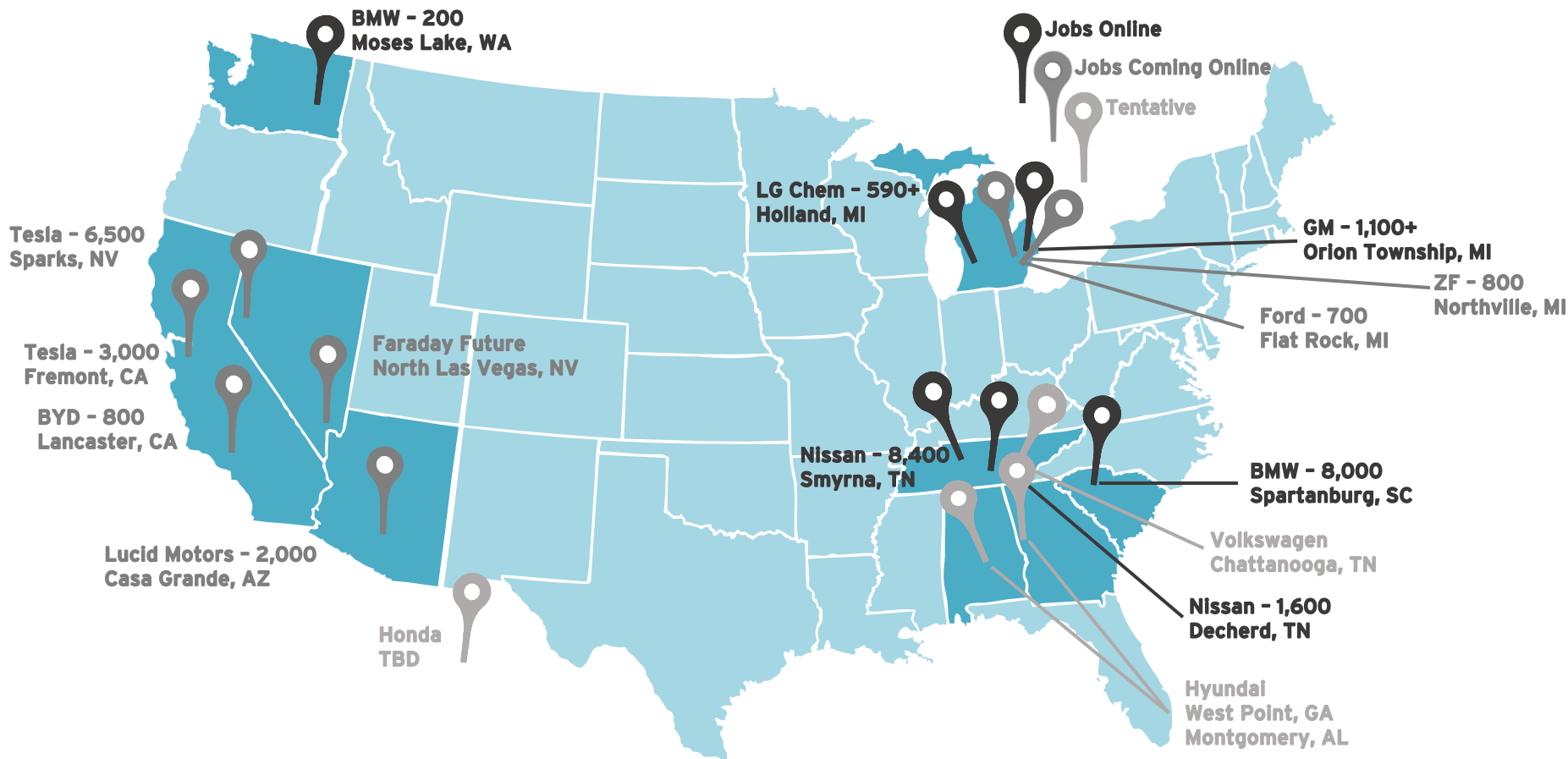
Technology and prices helped oil industry job growth frequently outpace BLS forecasts in recent years. At peak employment in 2014, the shale oil revolution helped create 219,000 jobs, a 180% increase over 2001 levels, most of which was in support services.



Source: SAFE analysis based on data from Bureau of Labor Statistics

Jobs and Automotive Innovation

Automakers are increasingly focused on PEV and autonomous vehicle technology. Over the past several months, they have announced the construction of new plants and changes to existing ones set to create thousands of jobs.



Note: Chart not intended to be comprehensive. Nissan, BMW (SC), and GM (MI) plants produce EVs alongside conventional vehicles.

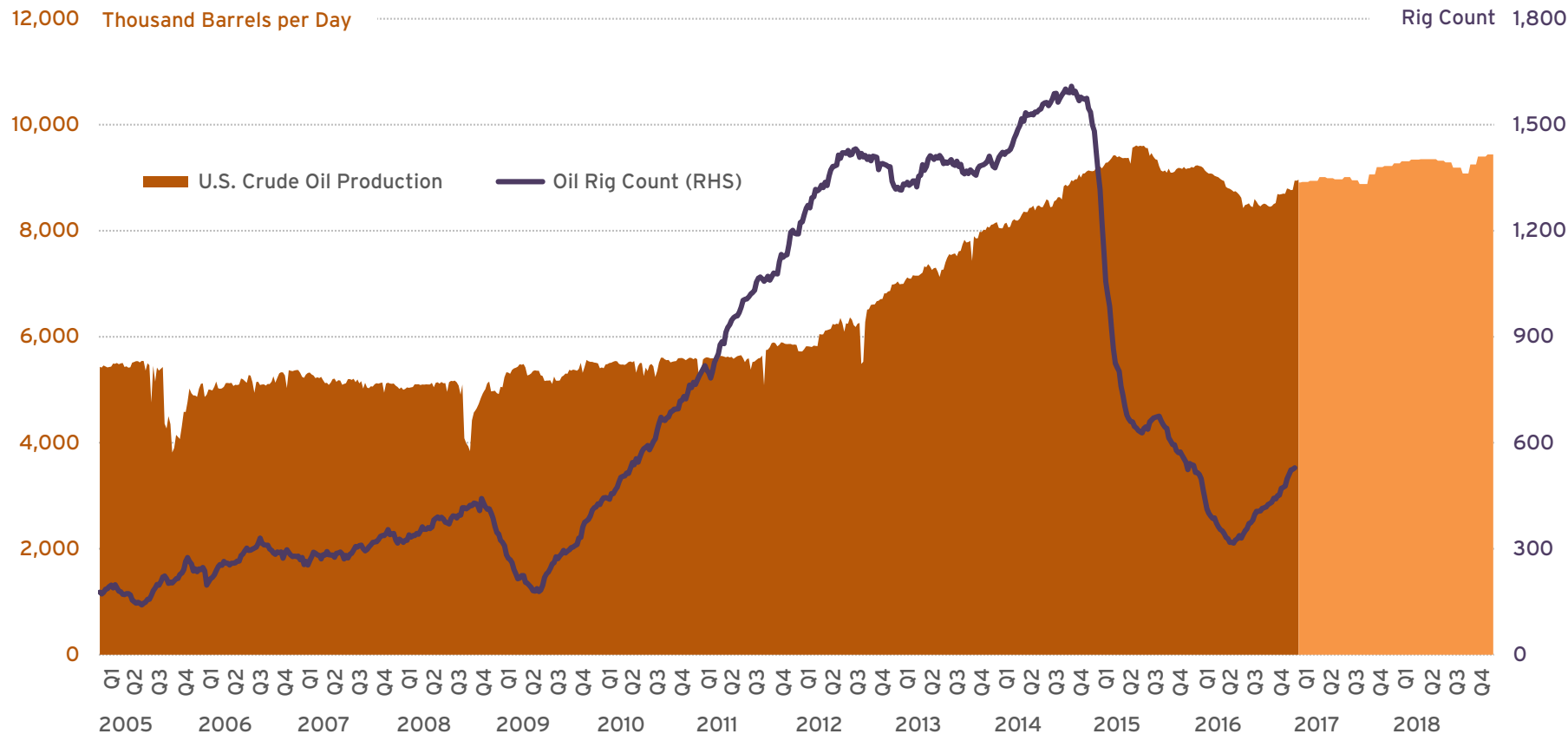
Source: Press Releases, News Reports

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U.S. Rig Count Roars Back

The U.S. oil rig count increased from 425 to 525 in Q4, a 23% increase quarter-over-quarter (q-o-q) after falling to its lowest point since 2009 in Q2. U.S. crude oil production grew for the first time in five consecutive quarters, reaching 8.7 mbd (+0.3 mbd q-o-q).

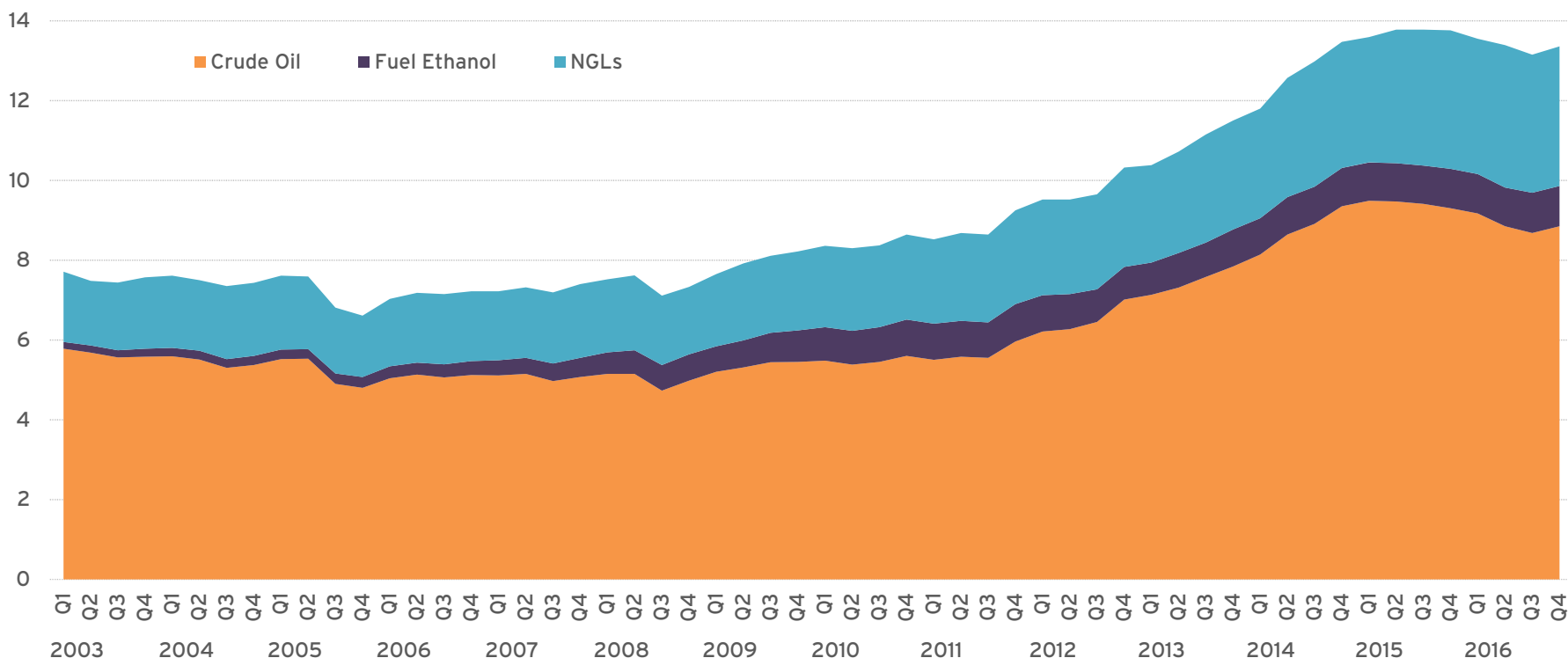


Source: EIA and Baker Hughes

U.S. Oil Production Shows Resilience, Begins Return

U.S. liquids production grew 0.2 mbd q-o-q in Q4. Inclusive of fuel ethanol and natural gas liquids (NGLs), total U.S. liquids production remains roughly 6.0 mbd higher than in 2008. Along with Saudi Arabia, the United States is among the world's largest liquid fuels producers.

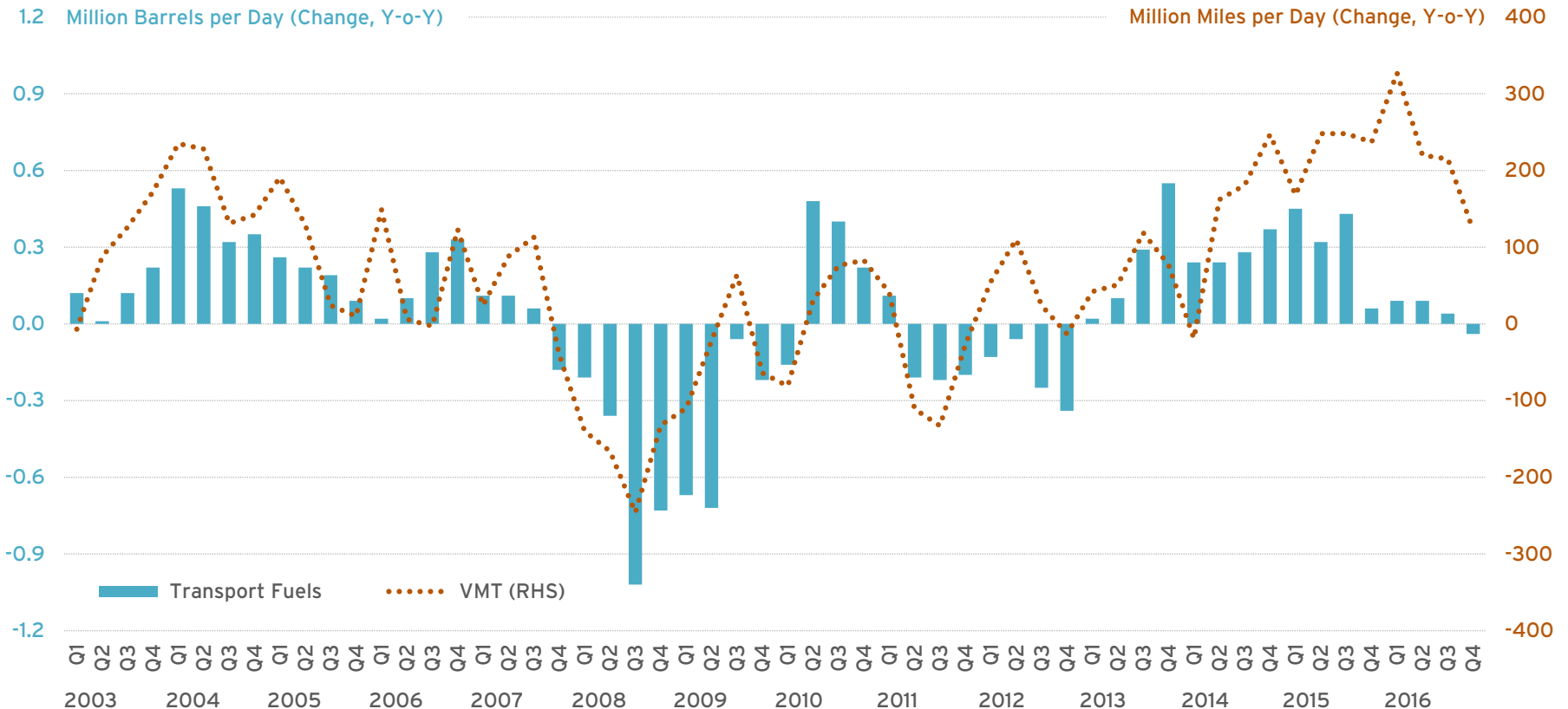
16 Million Barrels per Day



Source: SAFE analysis based on data from EIA

Y-o-Y Transportation Fuel Demand Growth Flat

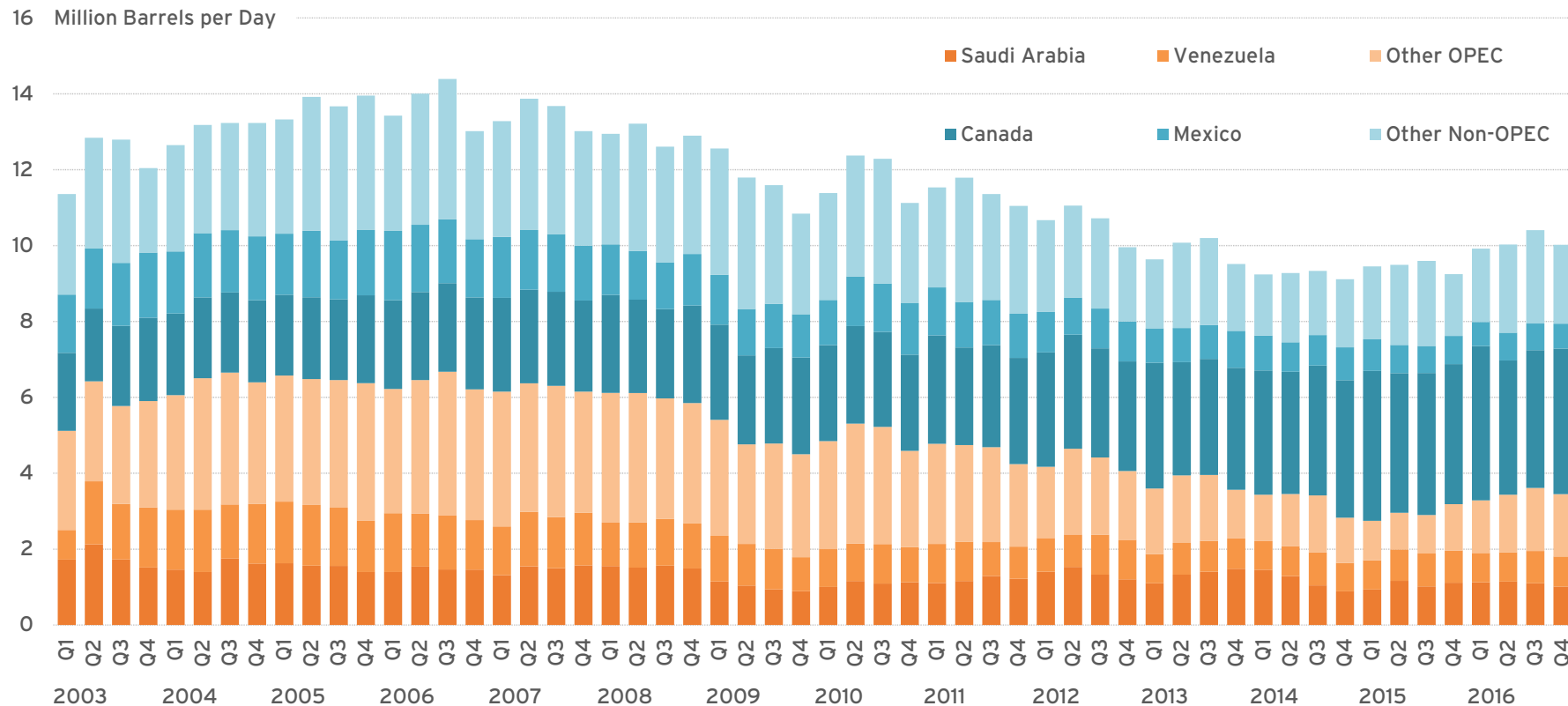
U.S. demand for gasoline, diesel, and jet fuel averaged 14.2 mbd in Q4, effectively flat y-o-y. Total vehicle miles traveled (VMT) has increased y-o-y for eleven consecutive quarters. In Q4, VMT rose by approximately 1.4% (+122 million miles y-o-y, slightly less than in recent quarters).



Source: SAFE analysis based on data from EIA

Imports From OPEC Hold Steady

U.S. crude oil and petroleum product imports were 10.0 mbd in Q4 (+0.1 mbd y-o-y) after falling from a four year high in Q3. OPEC's share of U.S. imports remained around 34% y-o-y at 3.4 mbd with Saudi Arabia the leading source (1.0 mbd of imports).

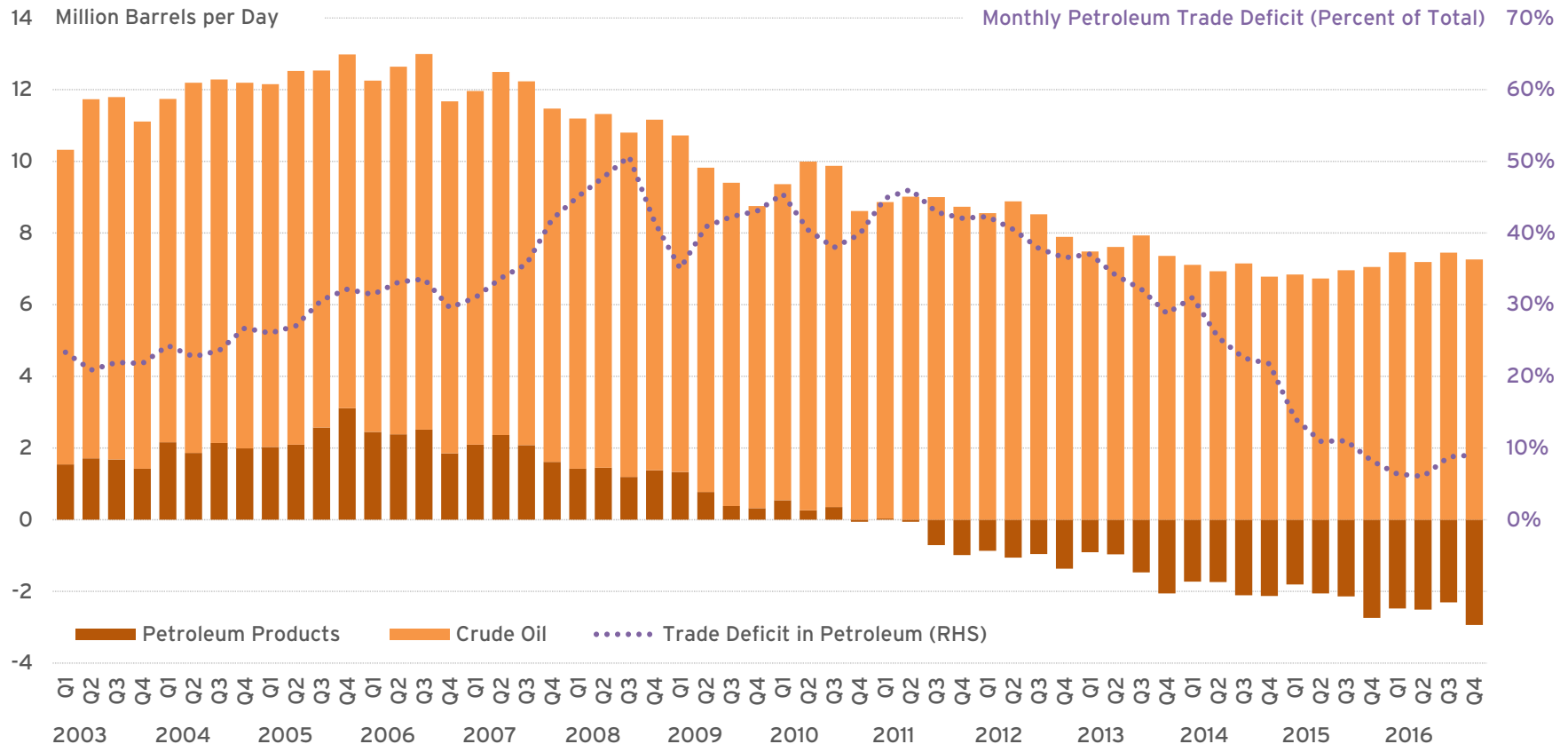


Note: Q4 2016 average calculated using October 2016 and November 2016 data.

Source: SAFE analysis based on data from EIA

U.S. Petroleum Trade Deficit Flat

Although U.S. net oil imports have fallen by two thirds since Q4 2005, the country remains reliant on imported oil. In Q4, net imports were more than 4.3 mbd, no change y-o-y. The United States became a net exporter of petroleum products in 2011.



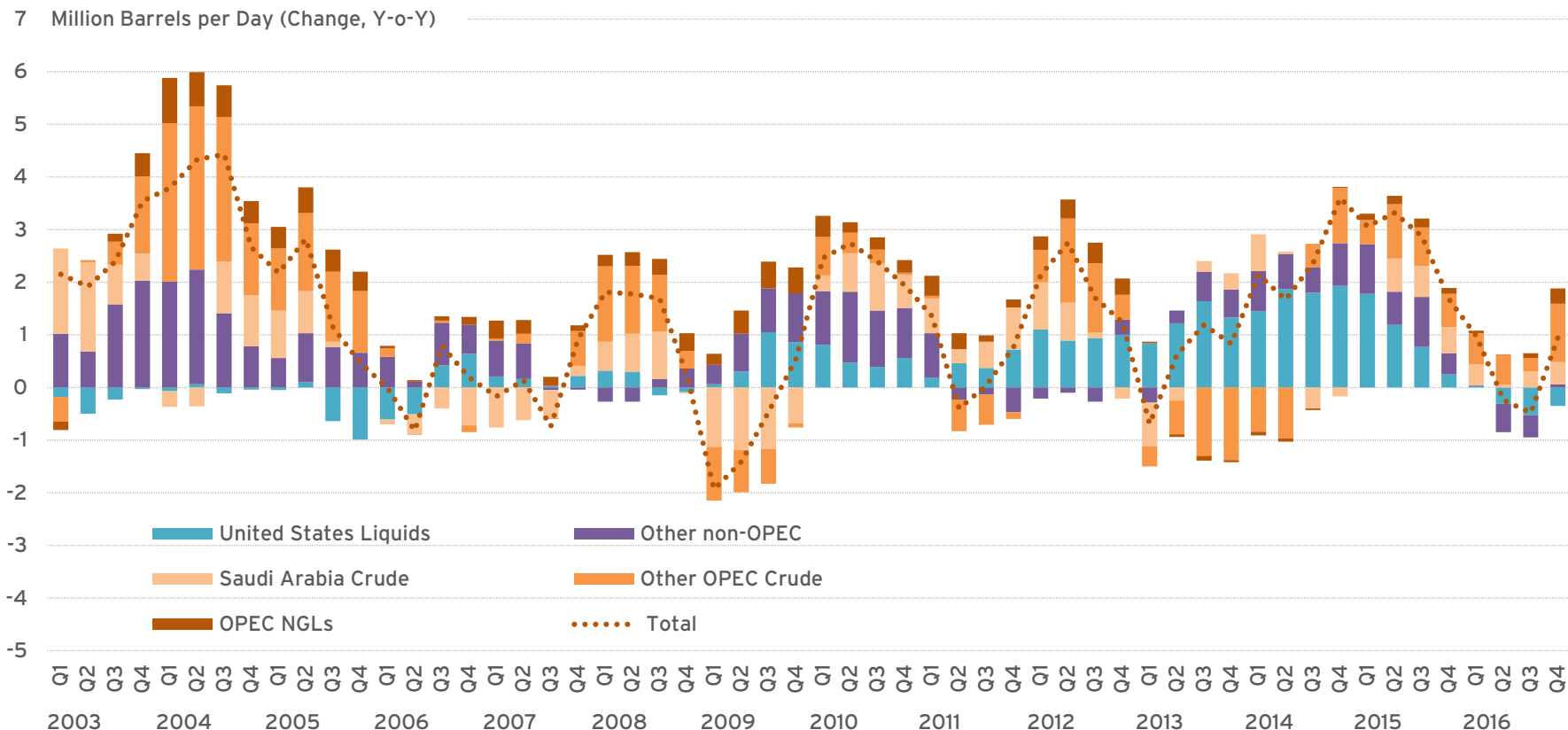
Source: SAFE analysis based on data from EIA

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Global Oil Supply Growth Returns

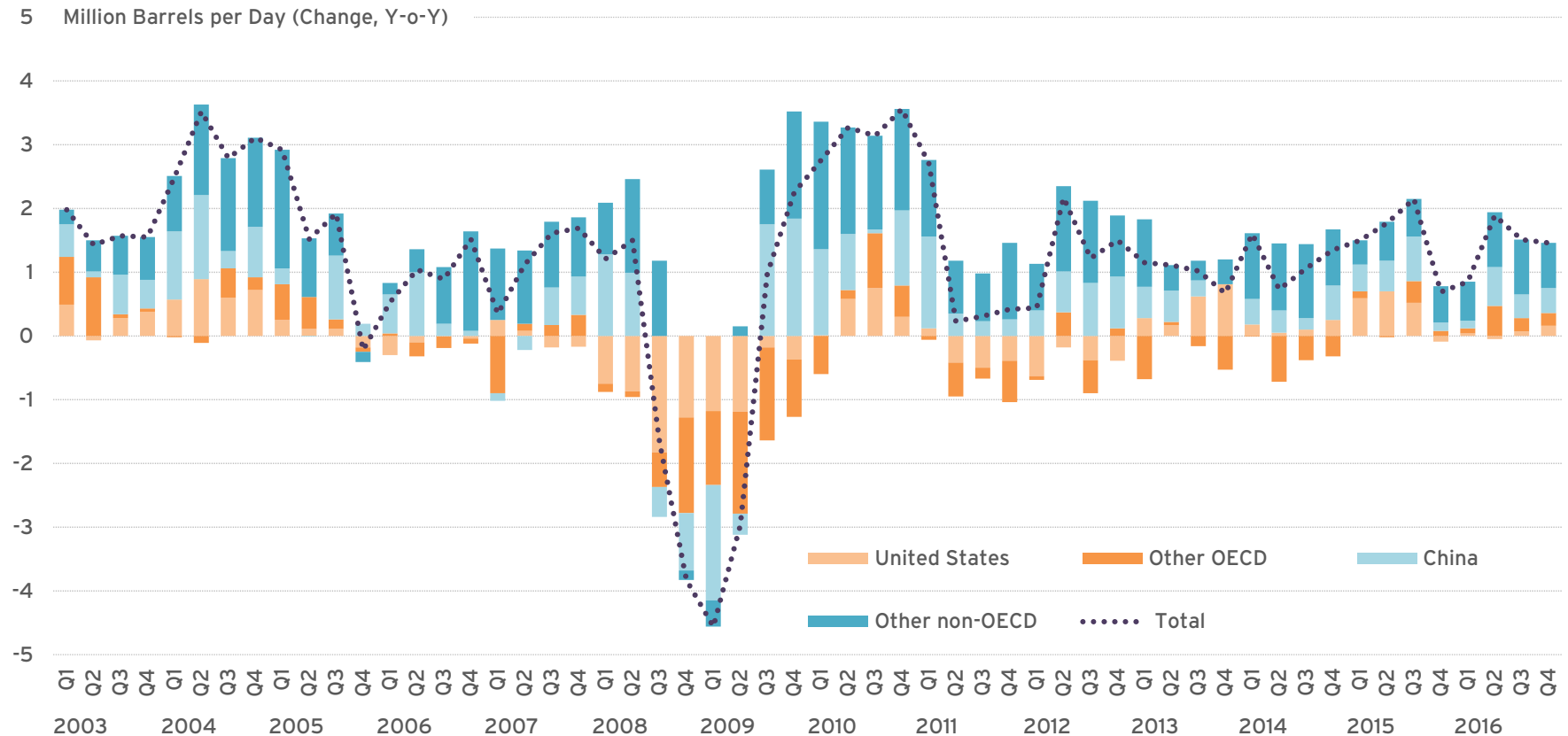
Global oil production increased 1.0 mbd y-o-y in Q4 led by sharp increases in other OPEC crude supply (+1.1 mbd y-o-y). Meanwhile, U.S. production fell for a third consecutive quarter (-0.4 mbd y-o-y). The United States contributed 77% of net global growth between Q1 2012 and Q2 2016.



Source: SAFE analysis based on data from EIA

Global Oil Demand Growth Remains Steady

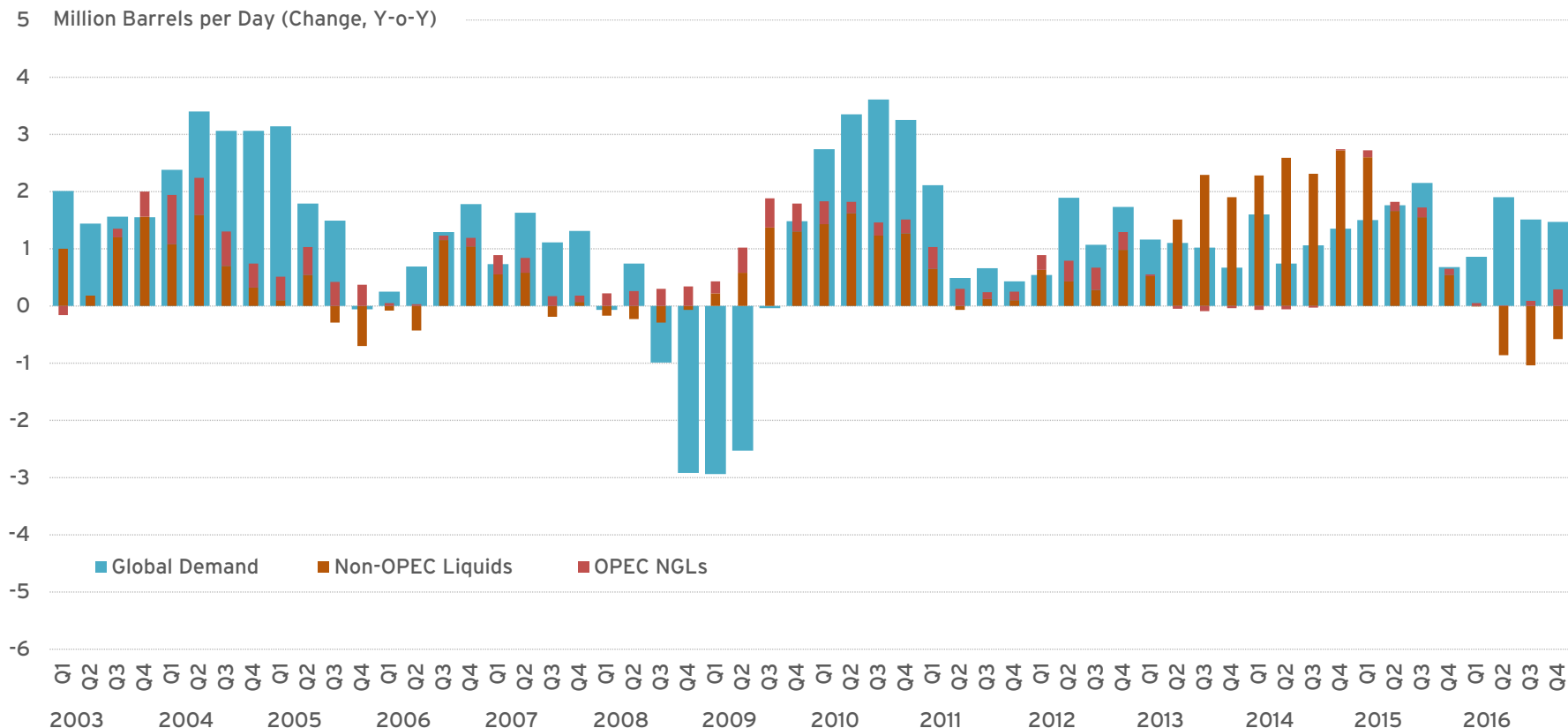
Global oil demand grew by approximately 1.5 mbd y-o-y in Q4 driven by growth in non-OECD countries (+1.2 mbd y-o-y). Demand in OECD countries rose 0.4 mbd y-o-y in Q4 to 46.8 mbd. Global oil demand has been increasing since 2009, reaching approximately 95.8 mbd in Q4.



Source: SAFE analysis based on data from EIA

Non-OPEC Supply Growth Stays Negative

Non-OPEC supply encountered a fourth consecutive quarter of decline (-0.6 mbd y-o-y). Global oil demand growth has exceeded non-OPEC liquids supply growth for the past seven quarters, a reversal versus Q2 2013 to Q1 2015, and a pattern last seen between Q2 2012 and Q1 2013.

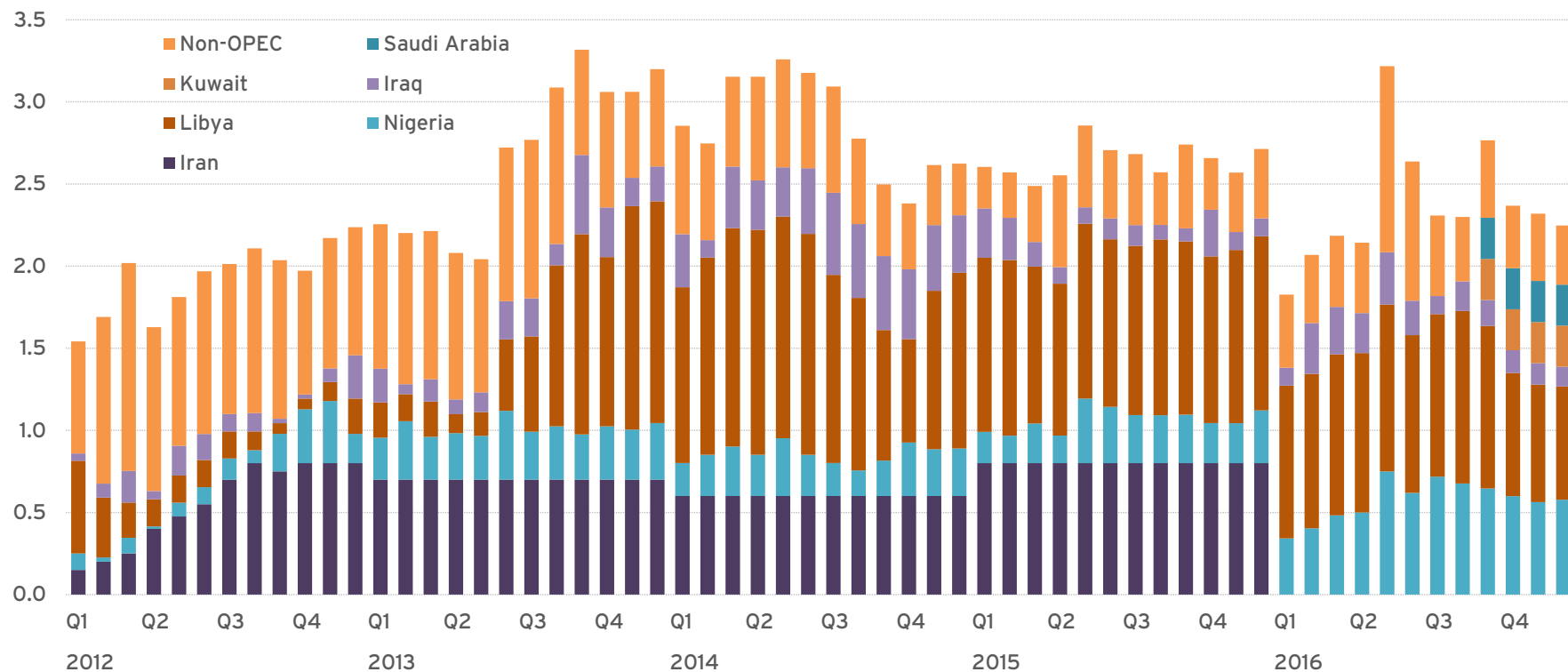


Source: SAFE analysis based on data from EIA

Unplanned Crude Oil Outages Slow

Global unplanned outages fell to 2.3 mbd in Q4 (-0.1 mbd q-o-q). However, new tensions between Kuwait and Saudi Arabia flared up over shared oil fields in the Neutral Zone. Ongoing political instability in Nigeria and Libya also contributed to extended disruptions.

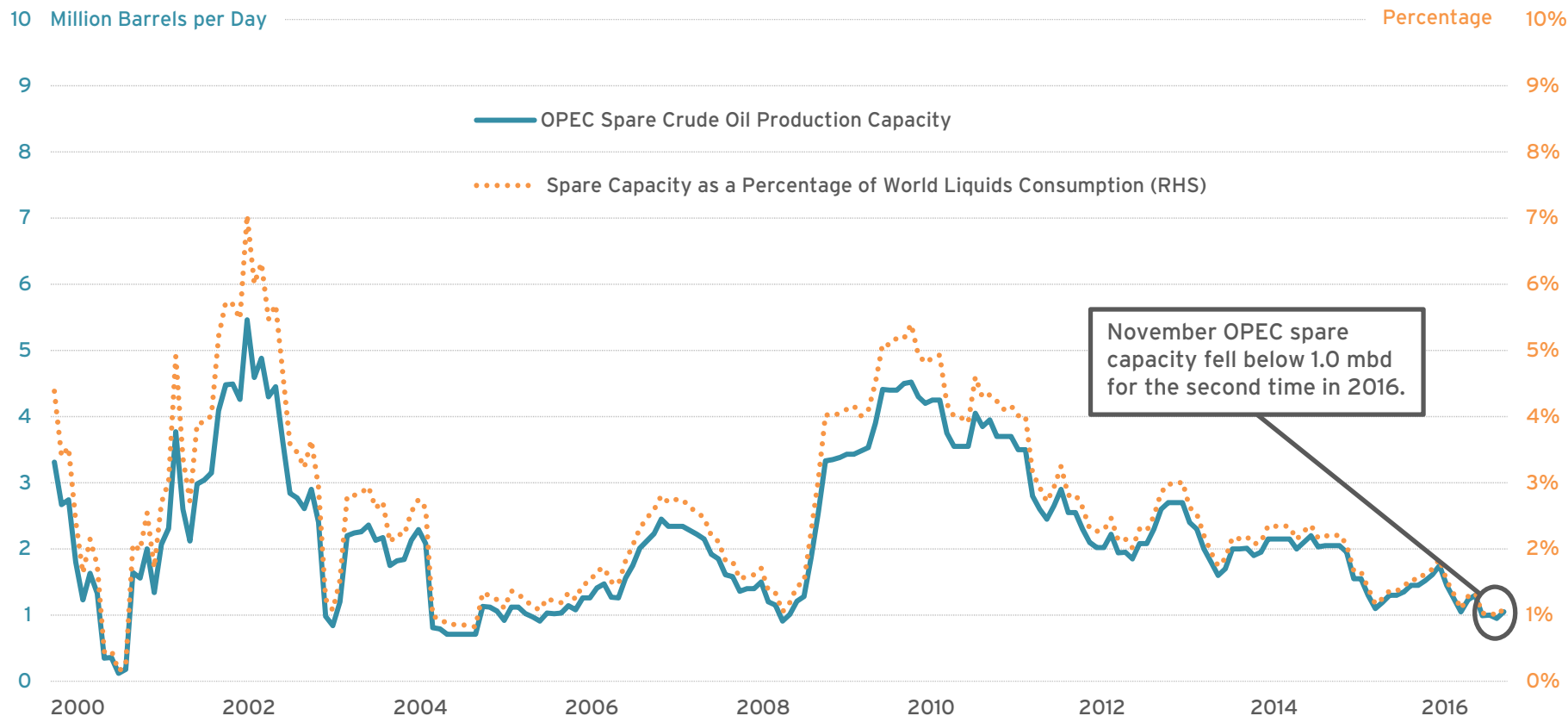
4.0 Million Barrels per Day



Source: SAFE analysis based on data from EIA

OPEC Spare Crude Oil Production Capacity Decreases

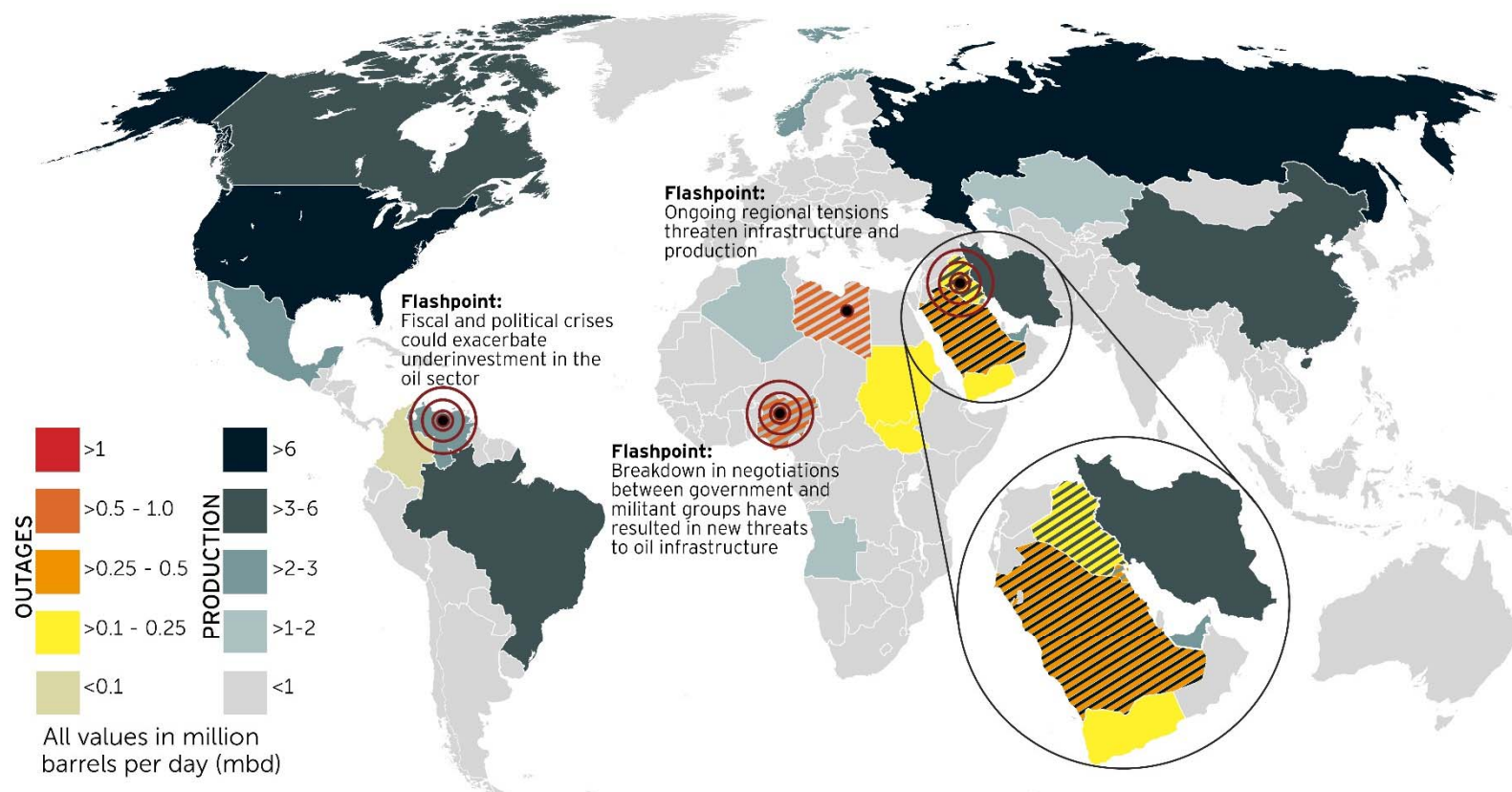
OPEC spare crude oil production capacity fell to just 1.0 mbd at the end of Q4 (-0.4 y-o-y). This is equivalent to approximately 1% of global consumption. The majority of OPEC's spare production capacity is held by Saudi Arabia.



Source: SAFE analysis based on data from EIA

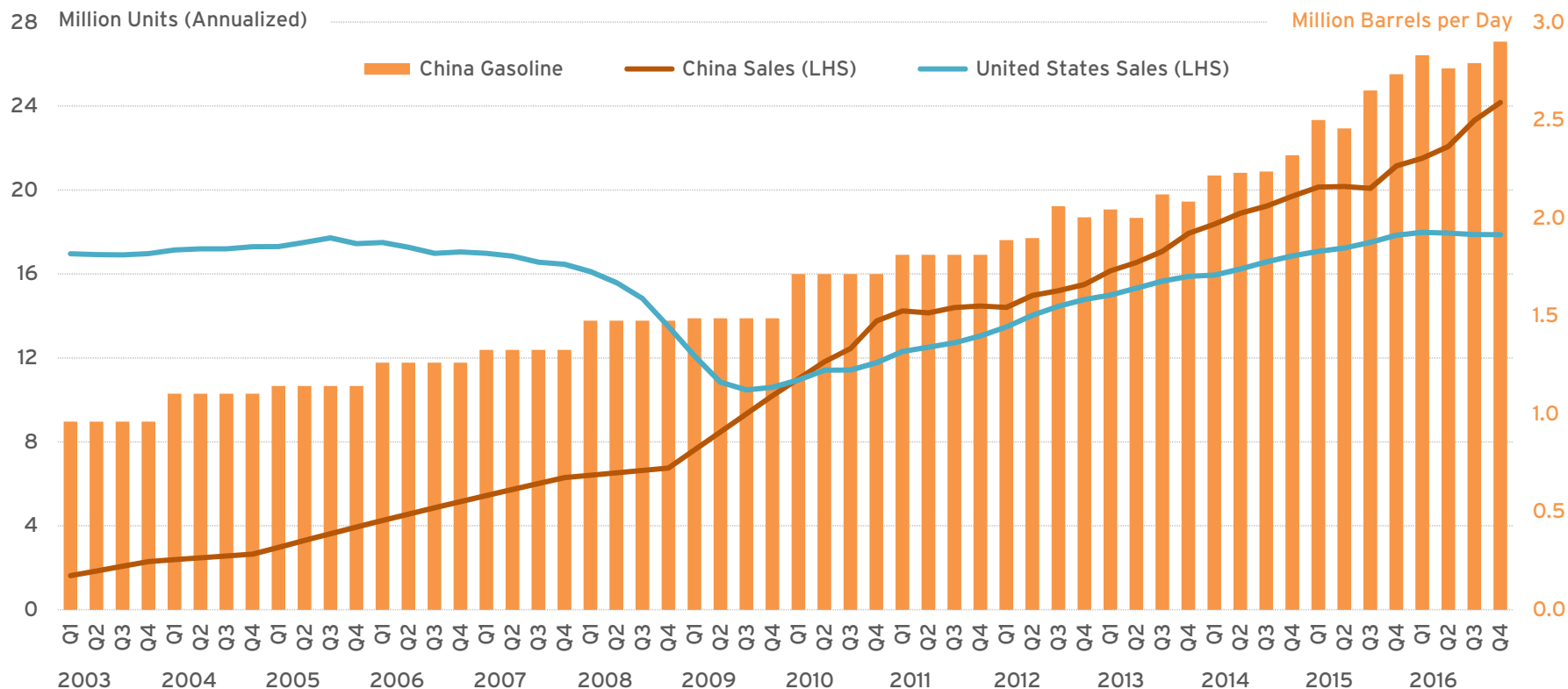
Barrels at Risk Map

Total oil supply outages averaged 2.3 mbd in Q4. Attacks on oil infrastructure increased outages in Nigeria's main oil-producing region, the Niger Delta, while tensions in Venezuela, Iraq, and other countries also threaten to further increase outages.



China Vehicle Sales Continue Rise

China's light-duty passenger vehicle sales increased by approximately 20% y-o-y in Q4, while gasoline consumption increased by only 2% y-o-y in October. China's vehicle sales have exceeded those in the United States since 2010.



Note: Four-quarter rolling averages presented for China's vehicle sales before 2010 and annual averages presented for China's gasoline demand before 2012. Q4 China gasoline includes only October data. Q4 China vehicle sales includes only October and November data.

Source: SAFE analysis based on data from BEA, IEA, and China Association of Automobile Manufacturers

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This chart displays the sales volume of light trucks and cars in the United States from 2003 to 2016. The left y-axis measures sales in million units, ranging from 0 to 21. The right y-axis measures the share of light truck sales as a percentage of total sales, ranging from 20% to 90%. Light truck sales are represented by the dark blue area at the bottom, and car sales are represented by the light blue area stacked on top. The orange line represents the share of light truck sales on the right-hand scale.

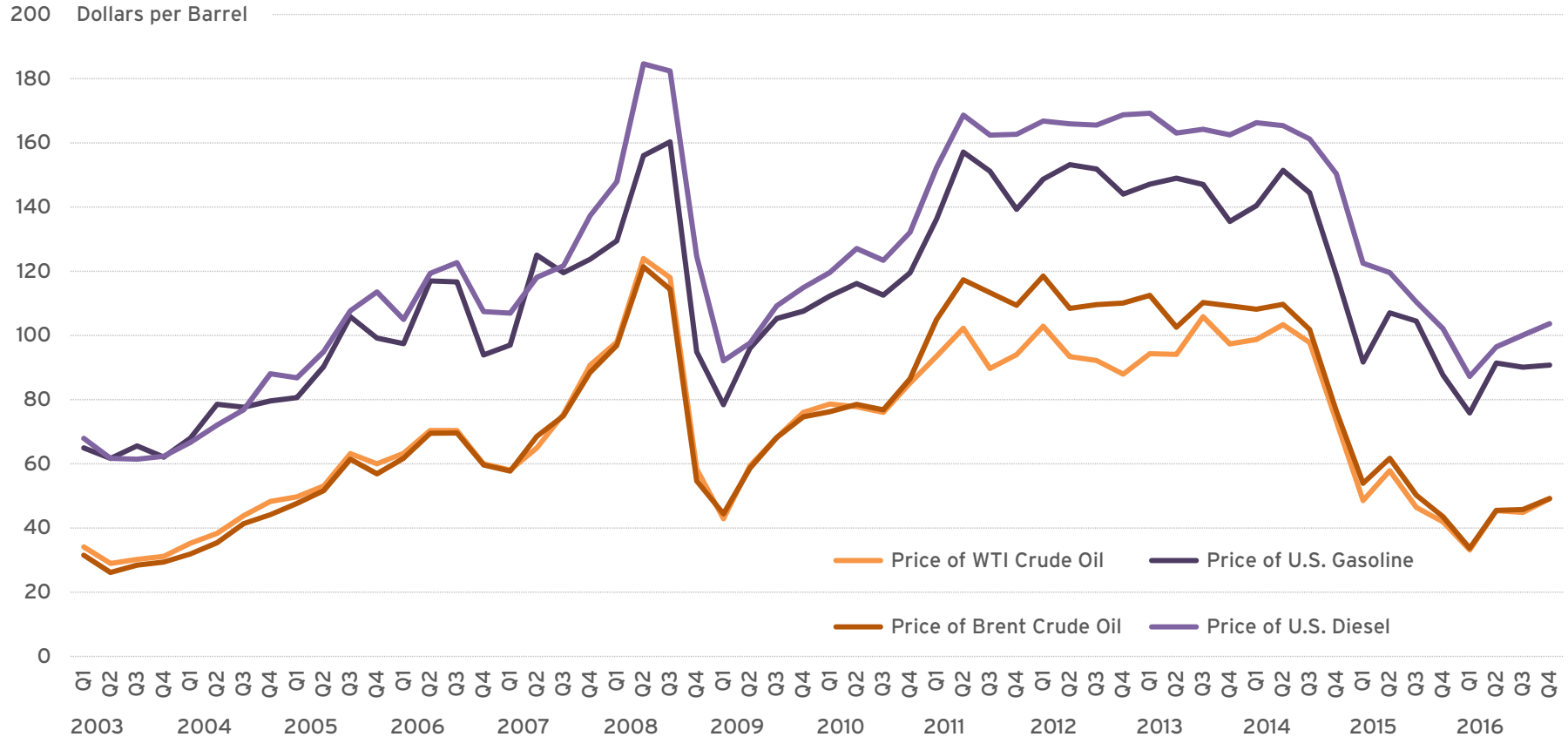
Year	Light Truck Sales (Million Units)	Car Sales (Million Units)	Share (Light Truck Sales) (%)
2003	8.5	7.5	53%
2004	9.0	8.0	53%
2005	9.5	8.5	52%
2006	9.0	8.0	53%
2007	8.5	7.5	53%
2008	6.0	6.0	50%
2009	5.0	5.0	50%
2010	5.5	5.5	50%
2011	6.0	6.0	50%
2012	6.5	6.5	50%
2013	7.0	7.0	50%
2014	7.5	7.5	50%
2015	8.0	8.0	50%
2016	8.5	8.5	50%



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Brent and WTI Prices Rise

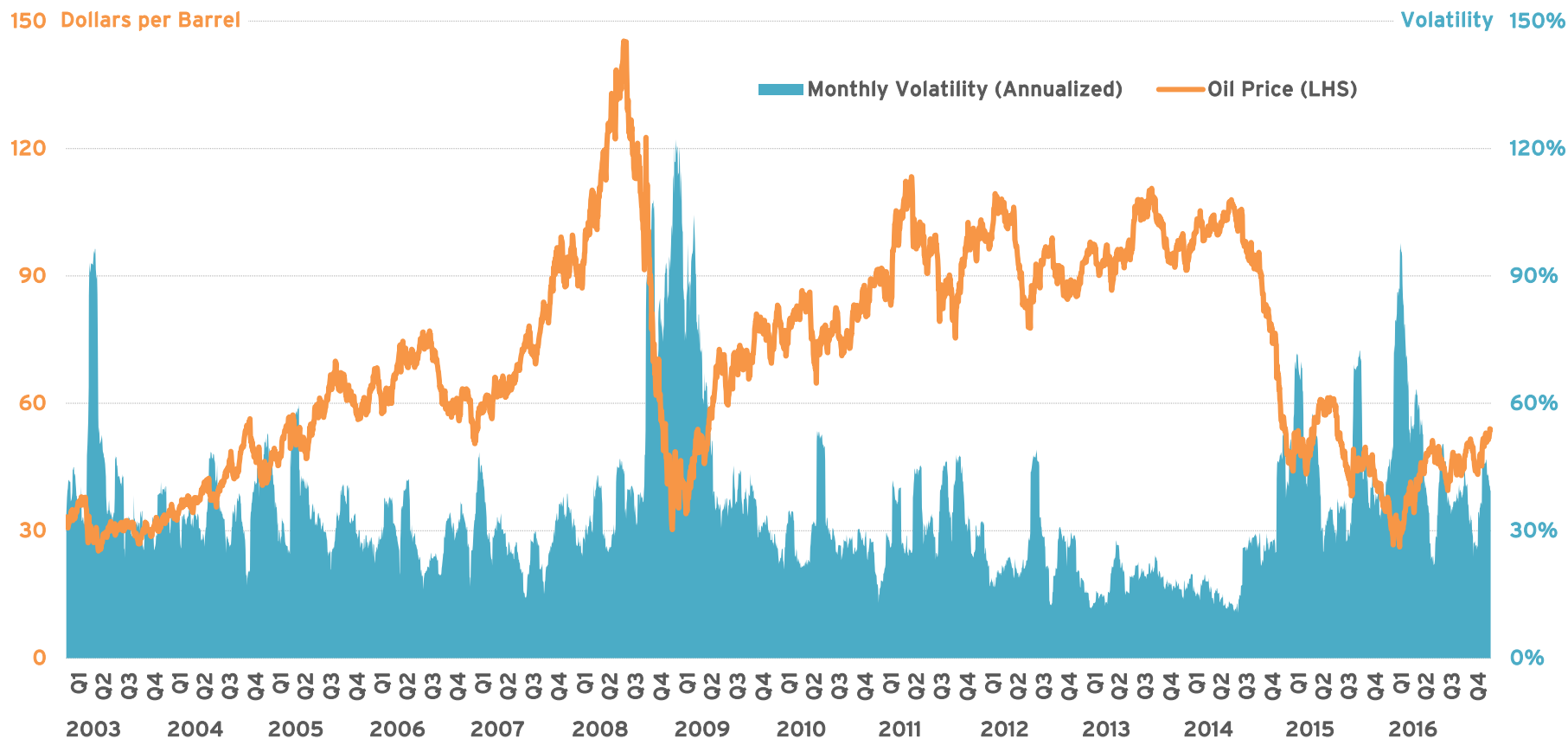
Prices of domestic petroleum products like gasoline and diesel correlate closely with prevailing global crude oil benchmarks. Oil and product prices increased in Q4 2016 after holding steady in Q3. December average Brent = \$53.32/bbl, WTI = \$51.97/bbl, U.S. gasoline = \$2.19/gal.



Source: SAFE analysis based on data from EIA

Oil Prices Volatile as OPEC Agrees to Cuts

Although volatility is down from 69% in Q1 2016, 30-day December volatility averaged 44%, up from 41% in Q3. OPEC's coordinated cuts helped precipitate a 6 percentage point increase in volatility y-o-y in December.



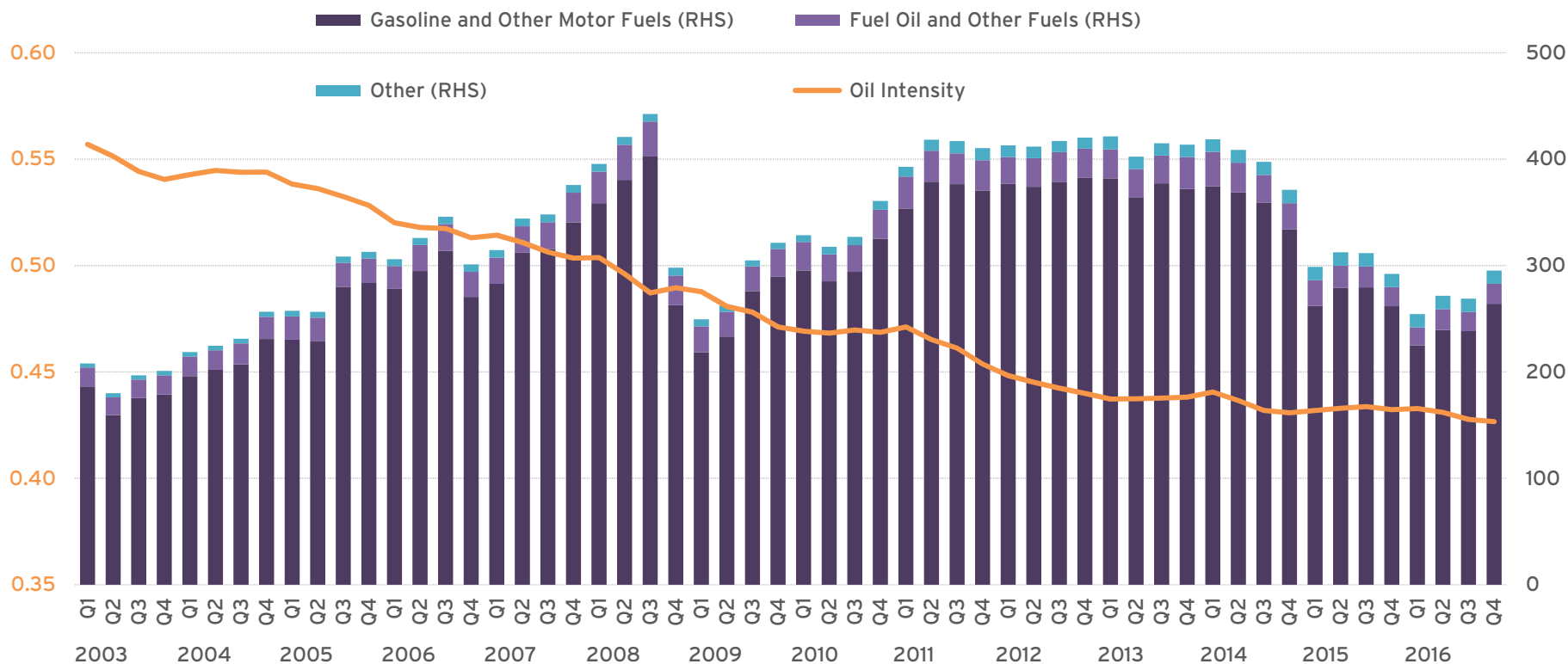
Source: SAFE analysis based on data from EIA

Oil Intensity Flat While Household Expenditures Rise

U.S. oil intensity and household spending on petroleum fuels remained effectively unchanged y-o-y in Q4 at 0.43 barrels per \$1,000 of GDP and \$295 billion, respectively. Household spending increased steadily each quarter in 2016 from its lowest levels since Q1 2009.

0.65 Oil Intensity (Barrels of Oil Consumed per \$1,000 of GDP)

Billion Dollars (Annualized) 600



Source: SAFE analysis based on data from EIA and BEA

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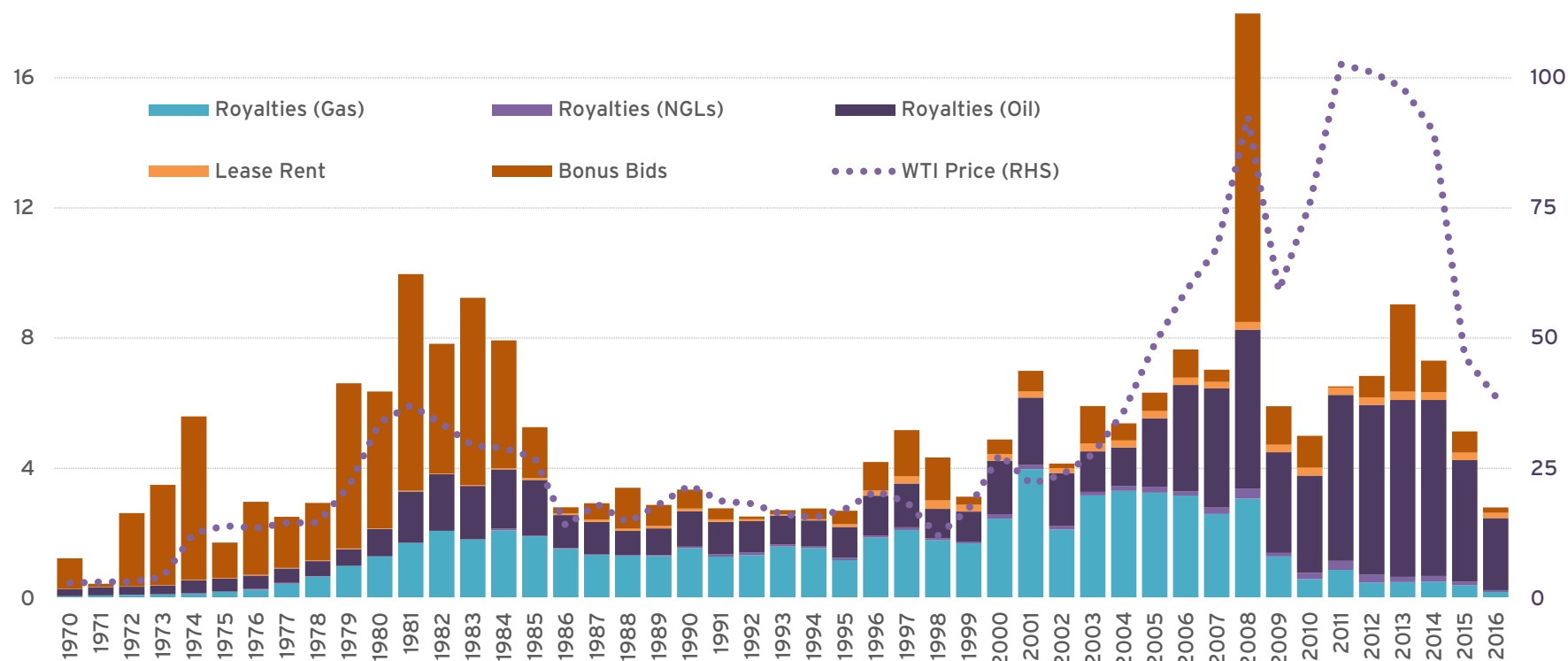
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Federal Outer Continental Shelf (OCS) Royalties Decline

Federal royalties from OCS activities fell to \$2.7 billion in 2016 as imported oil prices averaged \$39 per barrel. Expanding offshore access and investing revenues in an Energy Security Trust Fund represents an important opportunity to accelerate R&D for oil-displacing technologies.

20 Billion Dollars (Nominal)

Dollars per Barrel 125

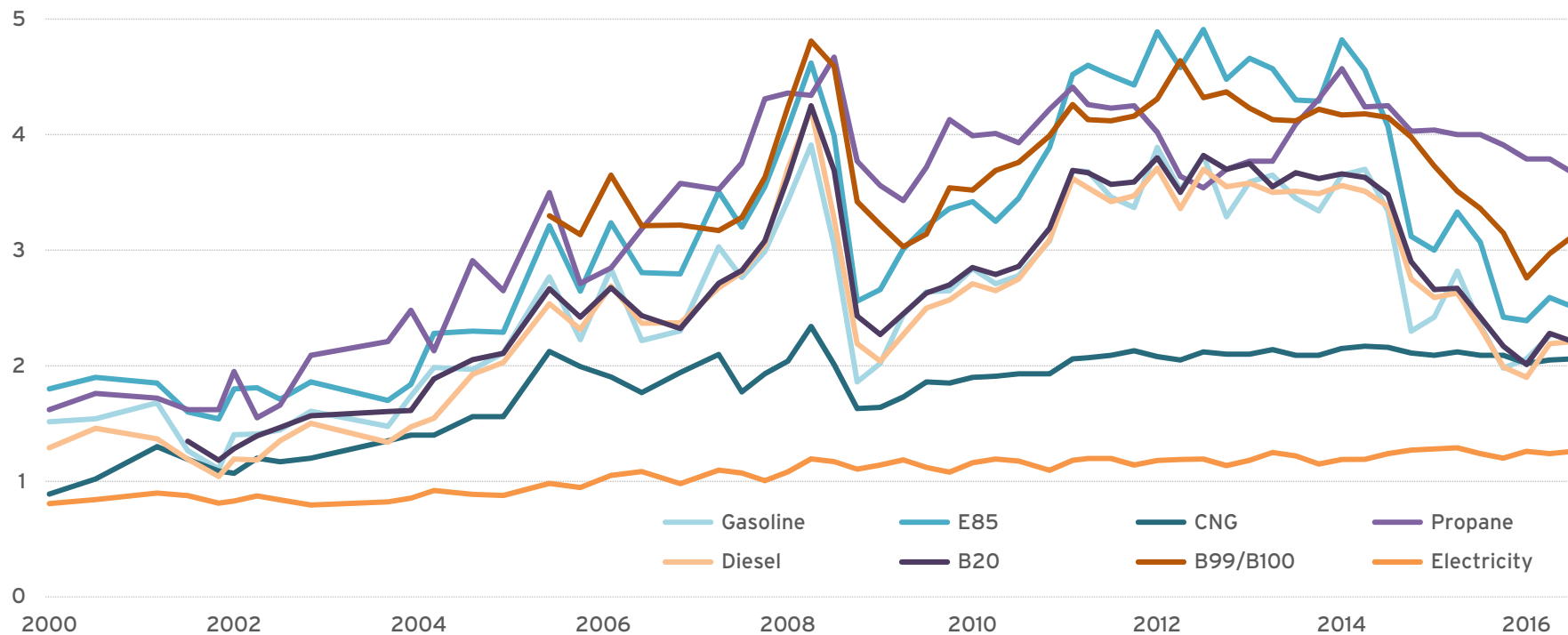


Source: SAFE analysis based on data from ONRR and EIA

Electricity and Natural Gas Prices Remain Stable

Despite recent decreases, liquid fuel prices have experienced substantial volatility since 2000. In H1 2016 they fell to multi-year lows. Meanwhile, the prices of compressed natural gas (CNG) and electricity have remained relatively stable during the same time period.

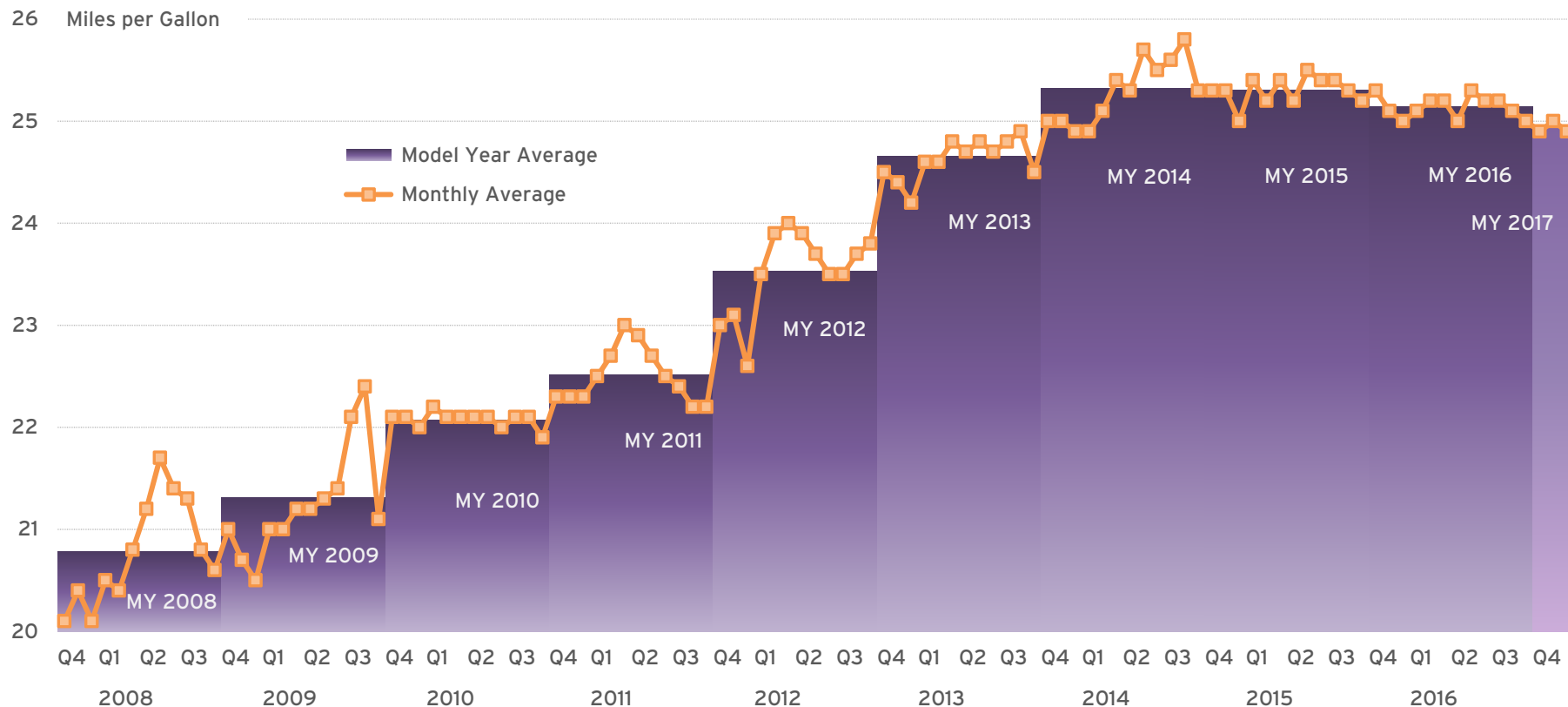
6 Dollars per Gasoline Gallon Equivalent (GGE)



Source: SAFE analysis based on data from Clean Cities Alternative Fuel Price Reports

New Light-Duty Vehicle Fuel Economy Ratings Declining

The average fuel economy rating of new light-duty vehicle sales fell 0.2 miles per gallon (mpg) y-o-y in Q4 to 24.9 mpg, continuing a two-year trend. MY 2016 fuel economy was 25.1 mpg, approximately 18% higher than 2009 levels.

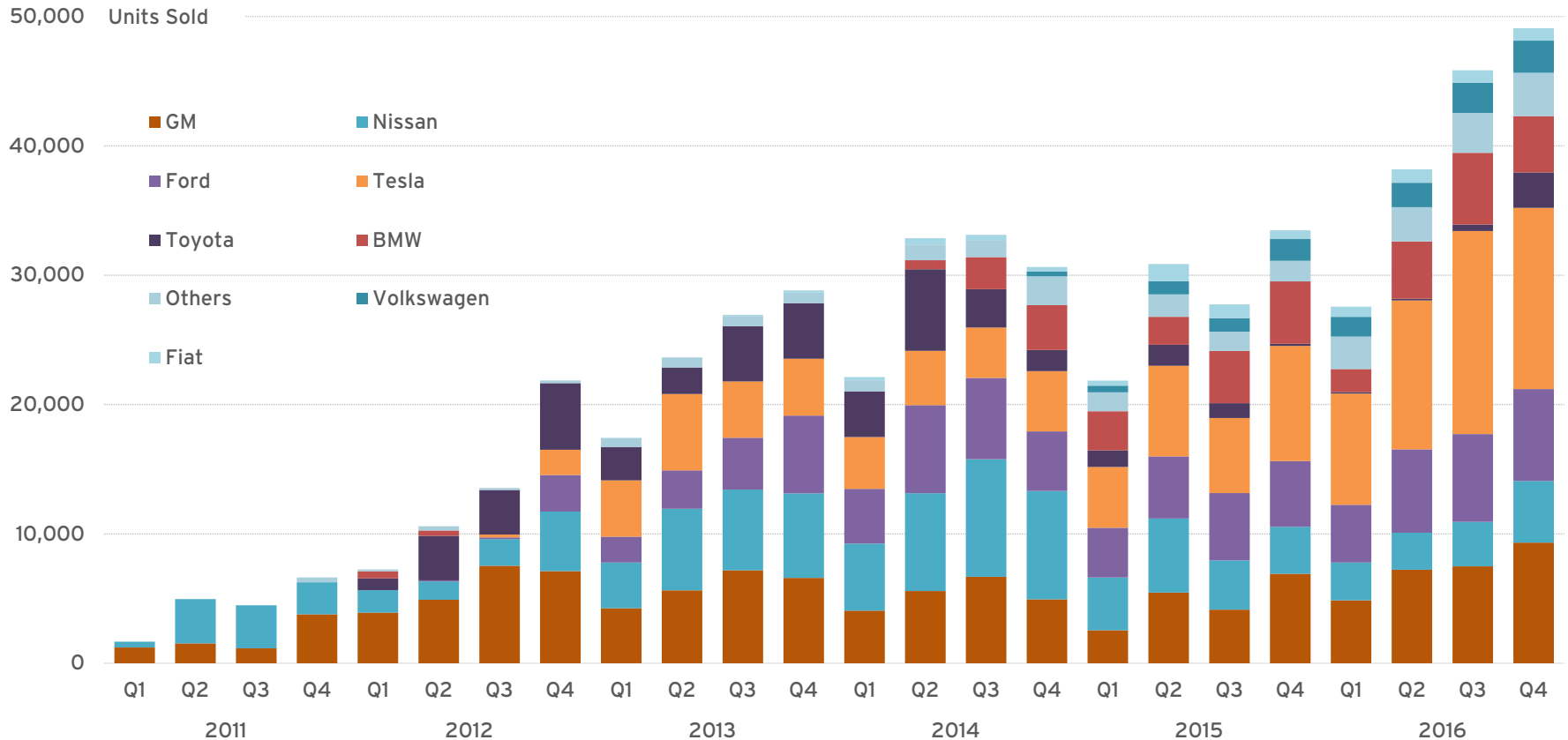


Note: Average sales-weighted fuel-economy rating of purchased new light-duty vehicles.

Source: SAFE analysis based on data from Michael Sivak and Brandon Schoettle, University of Michigan Transportation Research Institute

Plug-in Electric Vehicle Sales Reach New Record High

Approximately 49,000 plug-in electric vehicles (PEVs) were sold in Q4 (+46% y-o-y), the best quarter on record. Popular models included Tesla's Model S and Model X, as well as the Chevrolet Volt. The six best-selling vehicles accounted for approximately 70% of total sales.

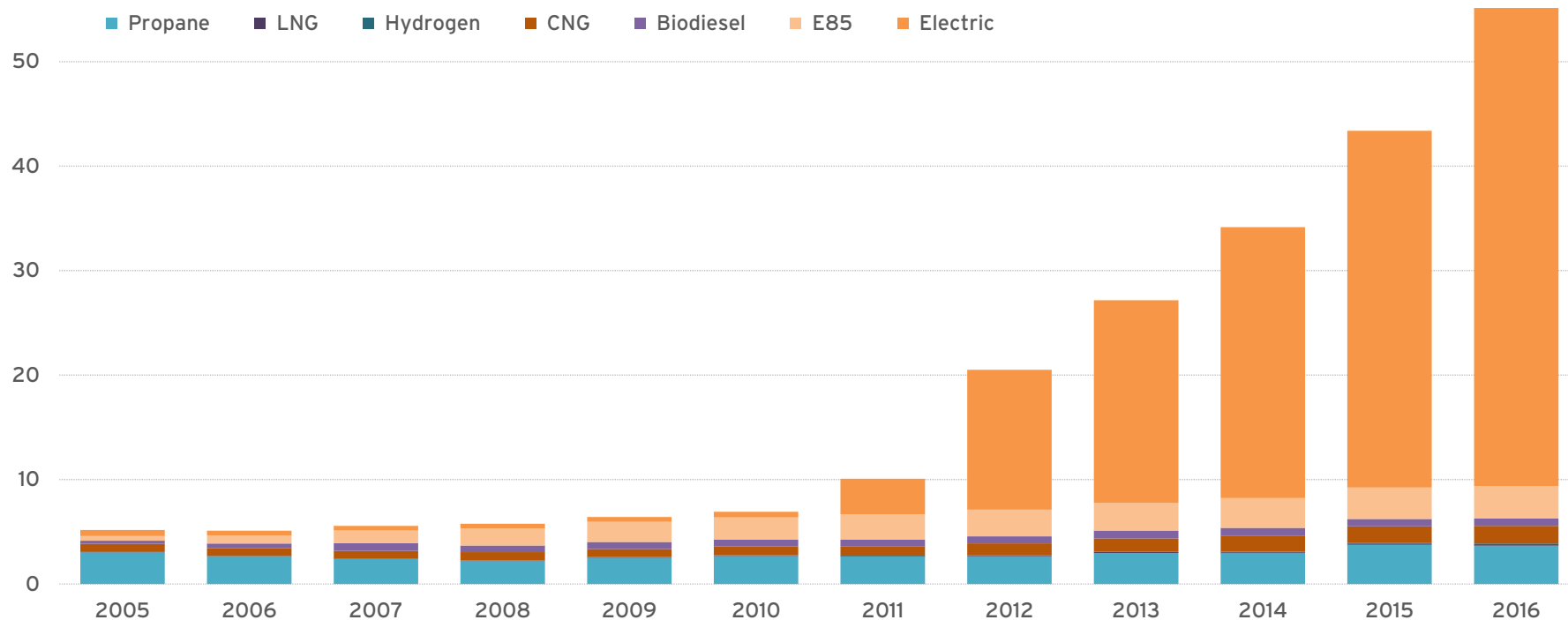


Source: SAFE analysis based on data from HybridCars.com

Alternative Fueling Stations Continue to Climb

The number of alternative fueling stations nationwide increased 103% between 2013 and 2016, a net addition of approximately 28,000 stations. The vast majority of these new additions (94%) were for electric charging.

60 Count at End of Period (Thousands)



Note: Starting in 2011, electric charge equipment was counted by the plug rather than by the geographic location. This is different than other fuels, which only count the geographic location regardless of how many dispensers or nozzles are on site.

Source: Alternative Fuels Data Center

About, Links, and Contact

ABOUT

Securing America's Future Energy (SAFE) is a nonpartisan, not-for-profit organization committed to reducing America's dependence on oil and improving U.S. energy security in order to bolster national security and strengthen the economy. SAFE has an action-oriented strategy addressing politics and advocacy, business and technology, and media and public education.

SAFE's Energy Security Fact Pack, launched in 2014, provides a data-driven overview of the latest trends in U.S. energy security, including domestic and global oil production and consumption, oil market dynamics, energy prices, consumer spending on oil, fuel efficiency, and alternative fuel vehicles.

WEB LINKS

SAFE: www.secureenergy.org

Electrification Coalition: www.electrificationcoalition.org

The Fuse: www.energyfuse.org



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