

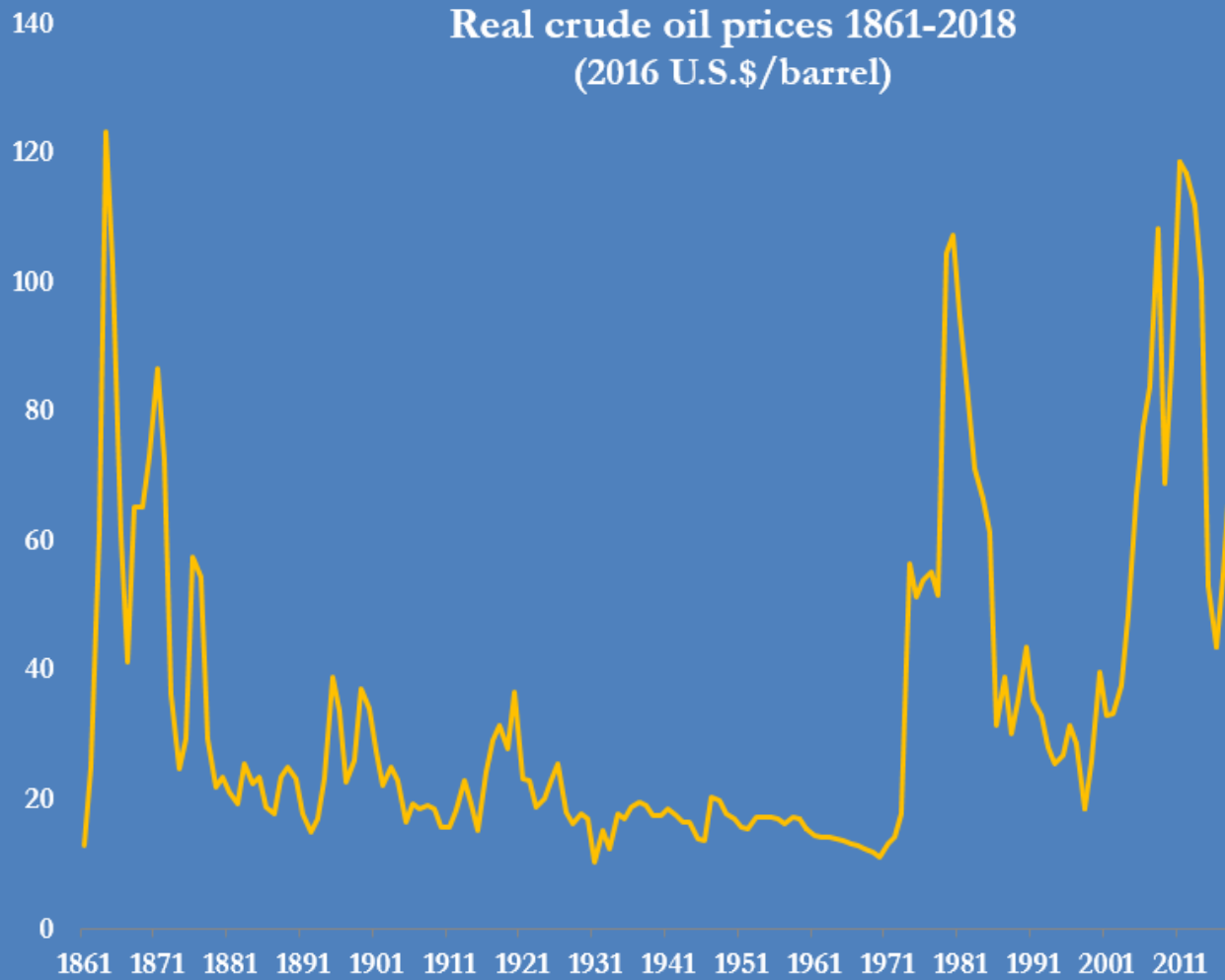
Oil price outlook 2018/2019

JOHN KEMP

REUTERS

20 June 2018

Oil prices since the start of the modern petroleum industry



Source: *BP Statistical Review of World Energy 2017* Reuters calculations for 2017 and 2018
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Oil market fundamentals

Oil industry has always been subject to **deep and prolonged cycles** of boom and bust and there is no reason to think the future will be any different

Cyclical behaviour is the distinguishing characteristic of oil markets and prices and rooted in the industry's structure

- Low price elasticity of supply and demand
- Backward-looking expectations and behaviour
- Positive and negative feedback mechanisms
- Complex adaptive systems

Multiple markets for crude, fuels, refining, services, engineering, construction, drilling, skilled labour, raw materials etc

Each market subject to its own feedback mechanisms, operating at different speeds and timescales, with constantly changing balances between supply and demand

Balancing “the oil market” actually means balancing all these markets simultaneously

Oil market is never really “balanced” or in equilibrium except accidentally and not for very long

Feedback mechanisms operate in oil markets and can delay as well as accelerate process of adjustment

Oil industry is characterised by a multiple feedback loops



Negative feedback loops dampen impact of an initial change and are therefore stabilising and promote rapid return to “equilibrium”

Positive feedback loops amplify the impact of an initial change and are therefore destabilising and delay return to “equilibrium”

Feedback concept was popularised by communications experts at Bell Telephone Laboratory in the 1920s

Long (implicit) history in economics: Adam Smith’s “invisible hand” and David Hume’s “price-specie-flow” mechanism are both instances of negative feedback loops

Examples of feedback mechanisms acting on oil supply and demand

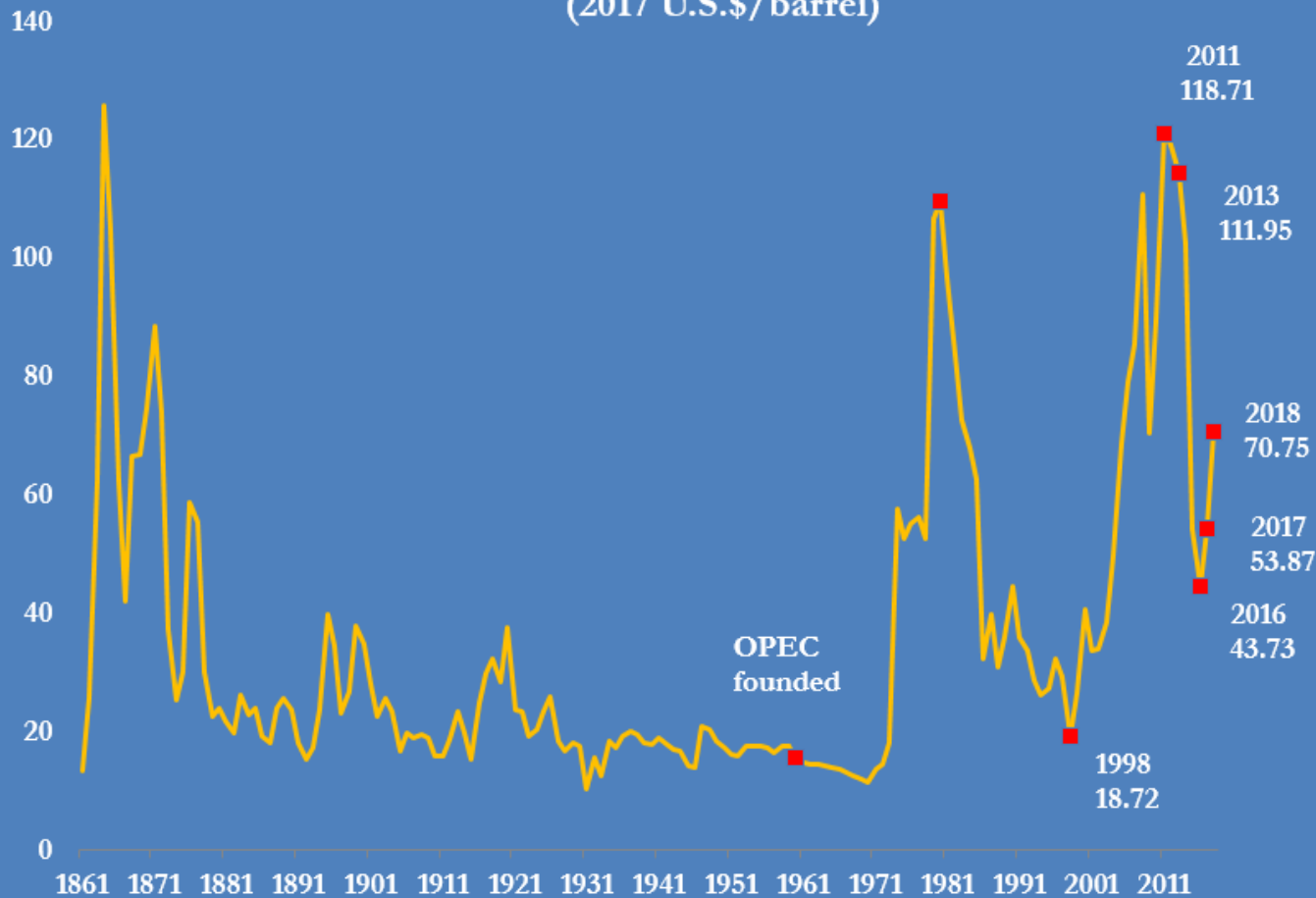
Positive feedback deepened slump, now accelerating rebound

	Supply-side	Demand-side
Negative feedback mechanisms (promote return to balance)	Capital budgets Cash flow Equity finance Debt finance	Fuel switching Fuel efficiency Energy conservation policy GDP impact in oil-consuming countries
Positive feedback mechanisms (delay return to balance)	Producers' revenue needs Labour costs Raw material costs Services contract adjustments Fiscal terms (taxes and royalties)	GDP impact in oil-producing countries Fuel consumption within the oil industry (drilling, refining, transportation) Fuel consumption throughout the oil supply chain (service companies and other suppliers)

Oil prices in long run perspective

Long boom, wrenching slump, now back to boom

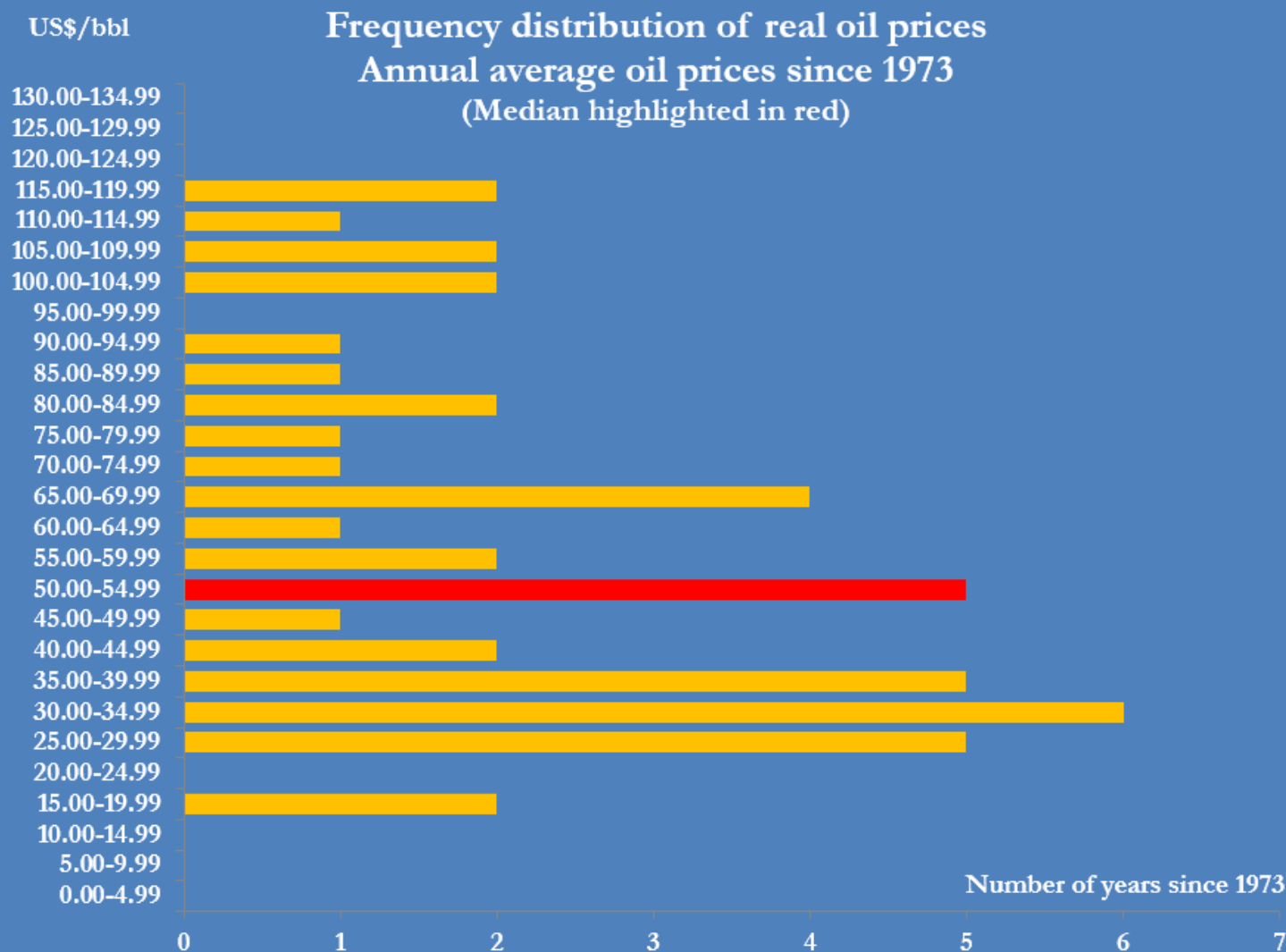
Real crude oil prices 1861-2018
(2017 U.S.\$/barrel)



Source: *BP Statistical Review of World Energy 2018*, Reuters calculations for 2018
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Oil prices are no longer low in real terms

Real oil prices now well into the upper half of the post-1973 distribution



Real oil prices again in the upper half of the cycle

Current oil price now slightly above the \$75 average for the last cycle

Brent crude price
One complete price cycle (1998-2016)
Front-month futures, real U.S.\$/bbl

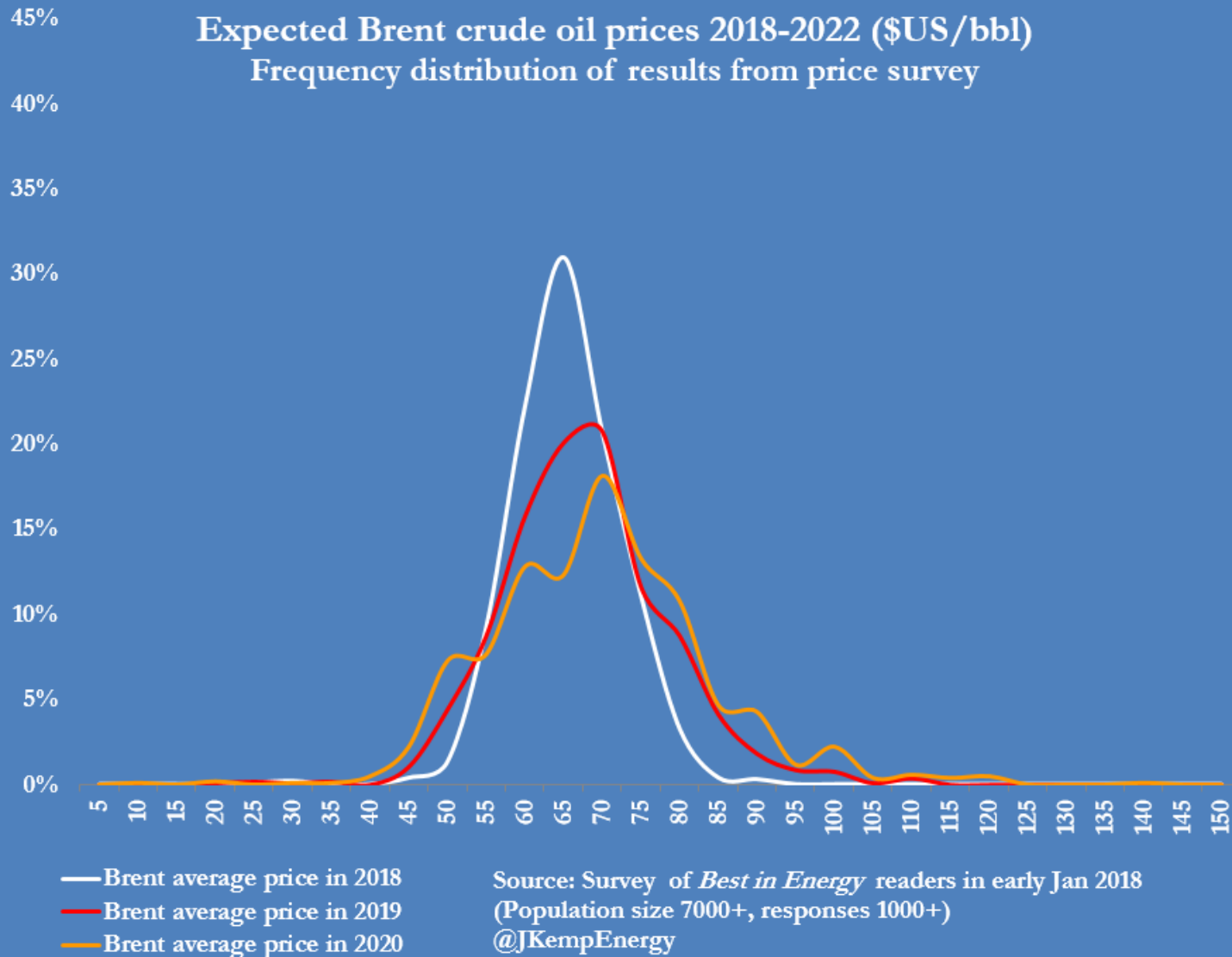


— Brent price (real U.S.\$ 2018 monthly average)
..... Brent price (U.S.\$ monthly average)

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Oil prices are now well above expectations at the start of the year

Energy market professionals expected prices to average \$70 by 2020



Oil market has rebalanced in 2017/18 after slump in 2014/15

Production restraint by OPEC and allies

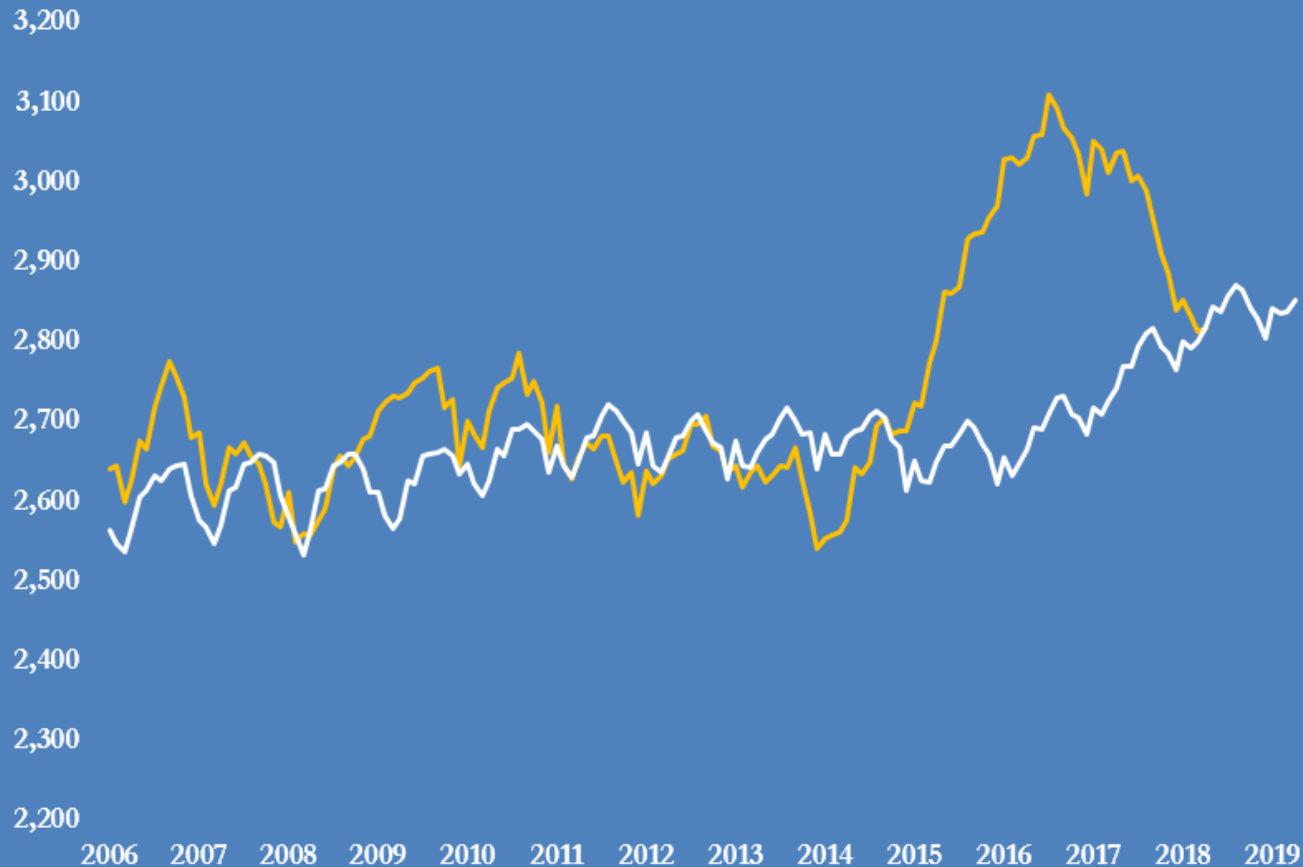
Involuntary production losses especially in Venezuela

Strong growth in consumption for fourth year running

Excess oil inventories have been eliminated

OECD oil stocks back in line with five-year average

OECD commercial crude and products inventories
actual compared with 5-year average, million bbl



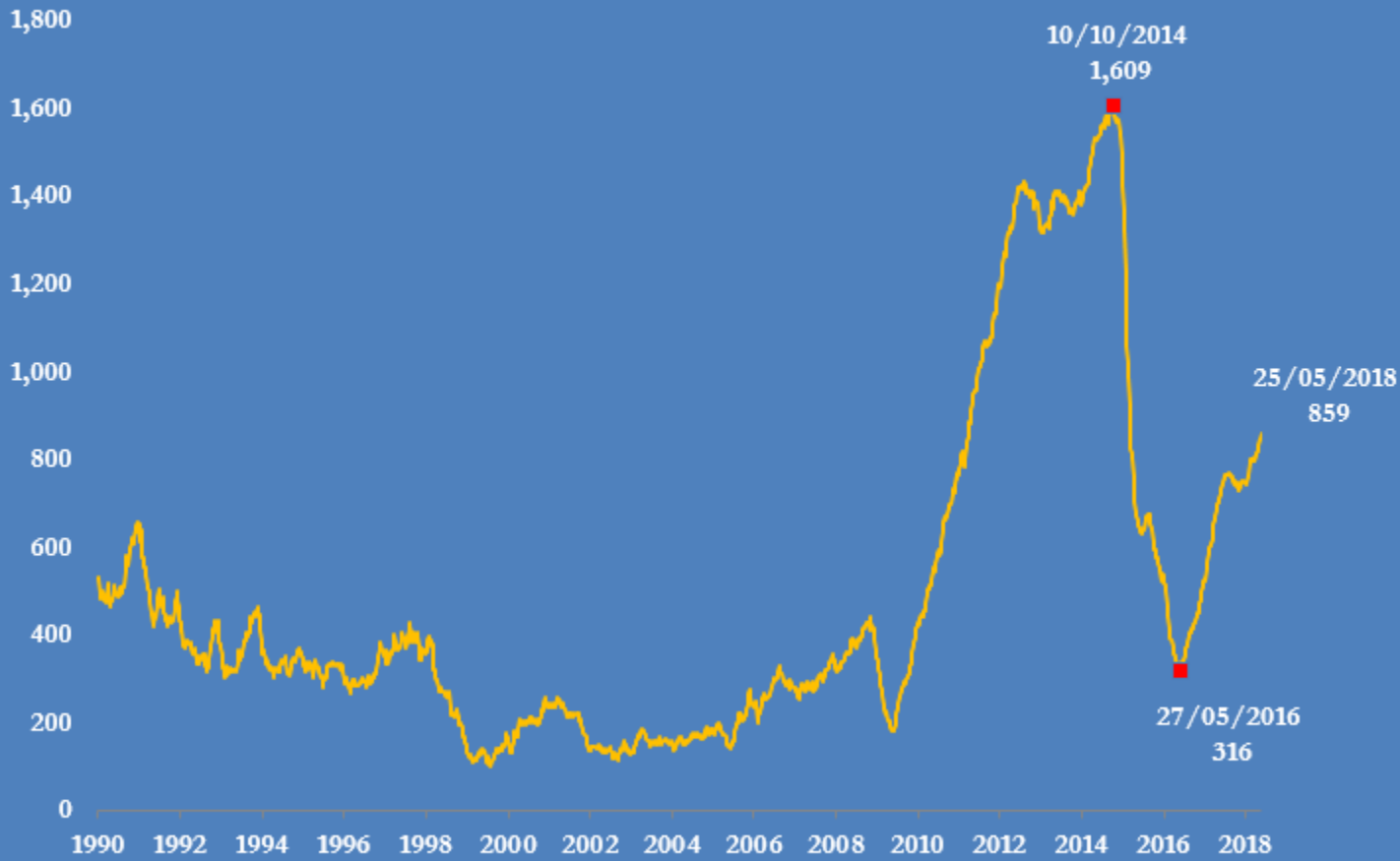
— OECD commercial inventories (crude + products)
— OECD commercial inventories (prior 5-year average)

Source: Energy Information Administration
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Higher oil prices have encouraged resumption of drilling

U.S. oil rig count has almost tripled since May 2016

Number of rigs drilling for oil in the United States



Source: Baker Hughes

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Rising rig count has brought a big increase in production

U.S. output up +1.3 million b/d year-on-year to record 10.5 million b/d in Mar

U.S. crude oil production, 1920-2018
000 b/d

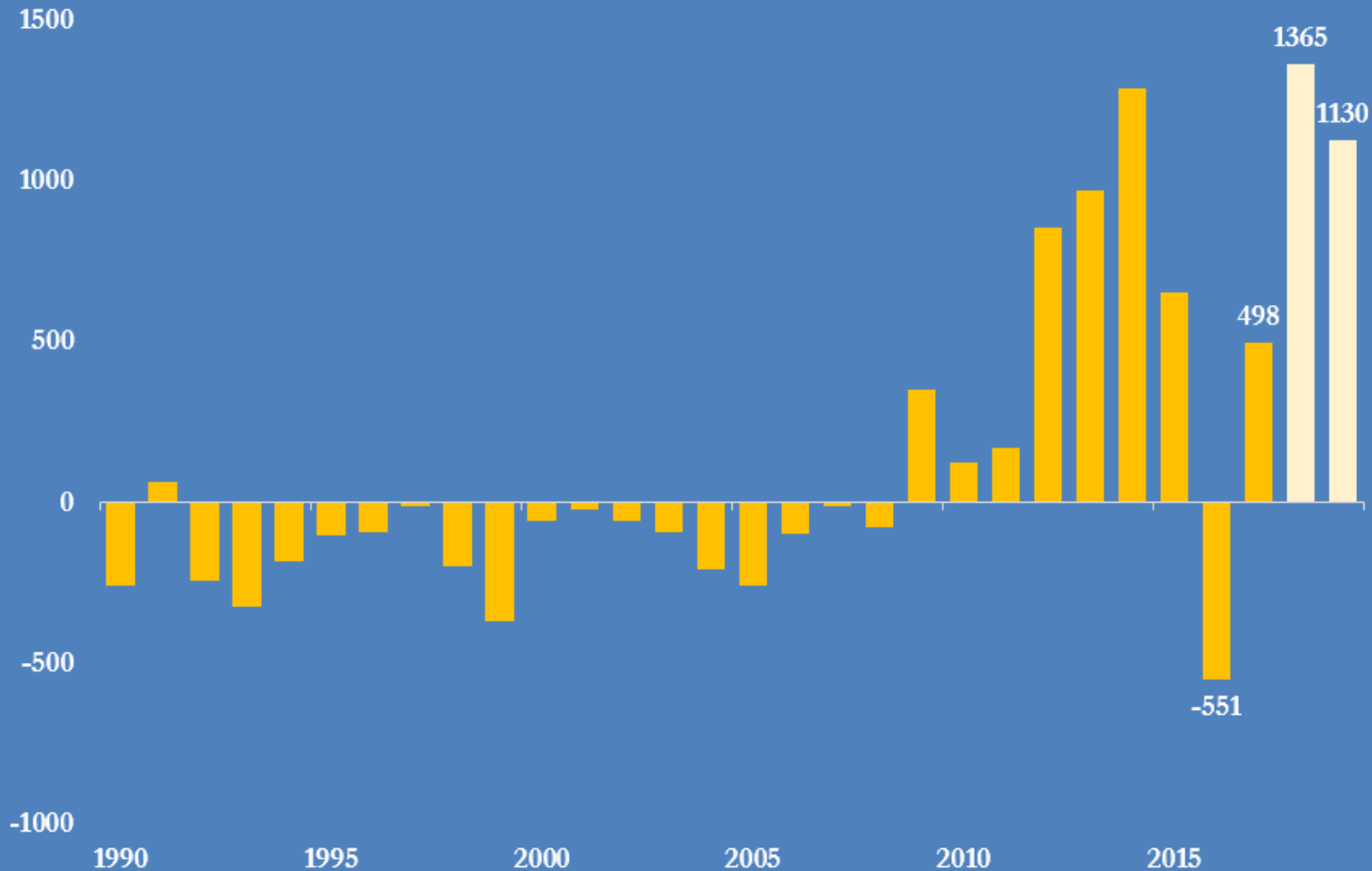


Source: U.S. Energy Information Administration

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U.S. crude output forecast to rise almost +1.4 million b/d in 2018 And another +1.1 million b/d in 2019

U.S. crude oil production
Annual increase 000 b/d (actual and forecast)



Synchronised global growth has boosted oil consumption

World trade volumes rising at fastest rate since 2011

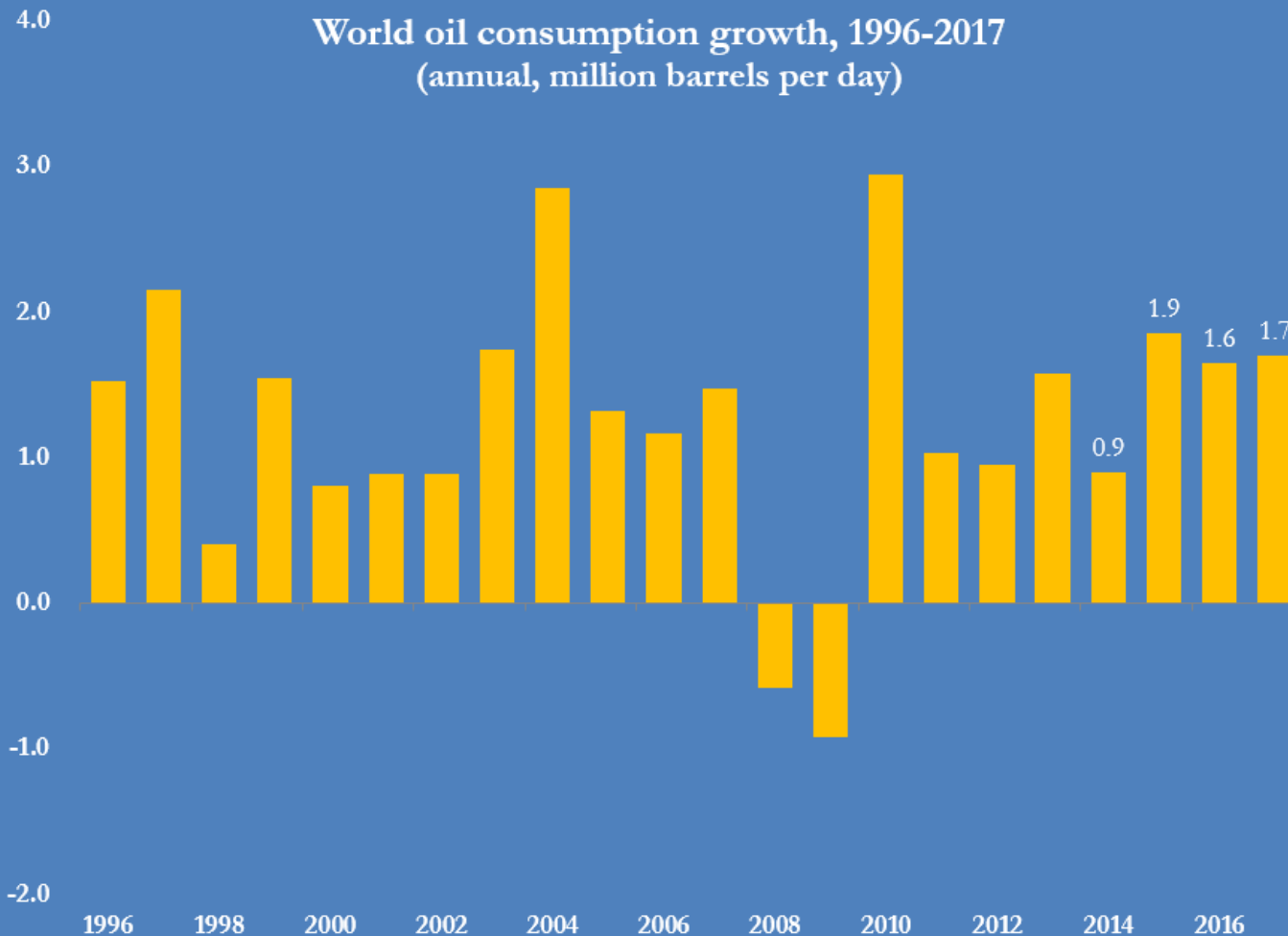


Source: Netherlands Bureau for Economic Policy Analysis, *World Trade Monitor*

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Oil consumption rose by average of +1.7 million b/d in 2015-2017

Acceleration from +1.1 million b/d in 2012-2014



Source: BP Statistical Review of World Energy (2018)
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Rising oil prices are a signal

Rebalancing in 2018/19 will mean precisely the opposite of 2016/17

More production from OPEC+

More production from U.S. shale

More production from non-OPEC non-shale

Slower growth in oil consumption

Next steps in the price cycle

Familiar from previous cycles

Rising output from U.S. shale producers

Relaxation of OPEC output curbs

Rising non-OPEC non-shale output

Renewed interest in fuel-efficient transport

Behaviour changes to cut fuel consumption

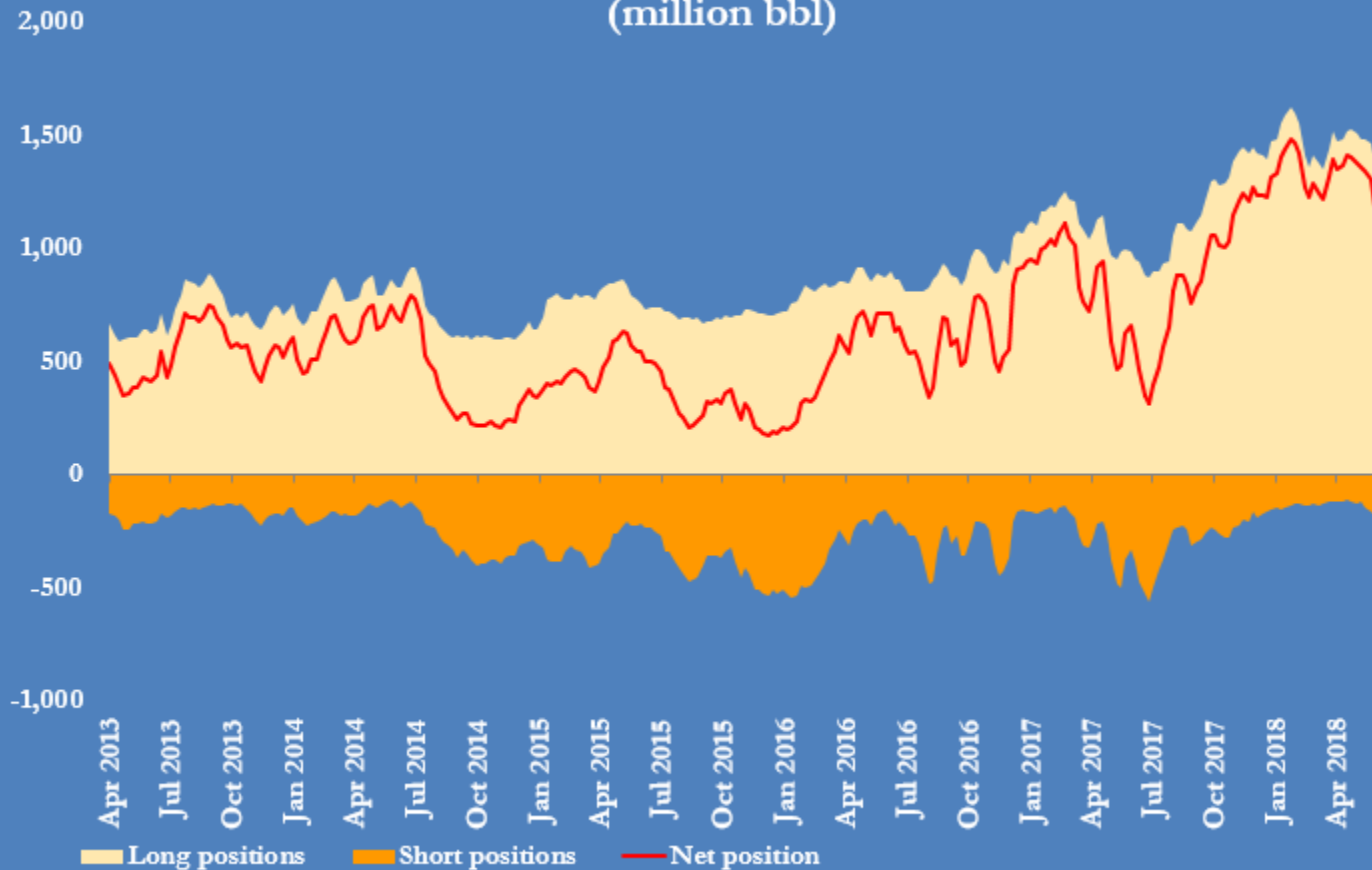
Growing interest in electric vehicles

Renewed interest in alternative fuels e.g. LNG/CNG

Hedge funds anticipated and accelerated rise in prices

Record bullish position helped push prices higher but presents liquidation risk

Money managers' total long and short positions in Brent, WTI, U.S. gasoline, U.S. heating oil and European gasoil (million bbl)

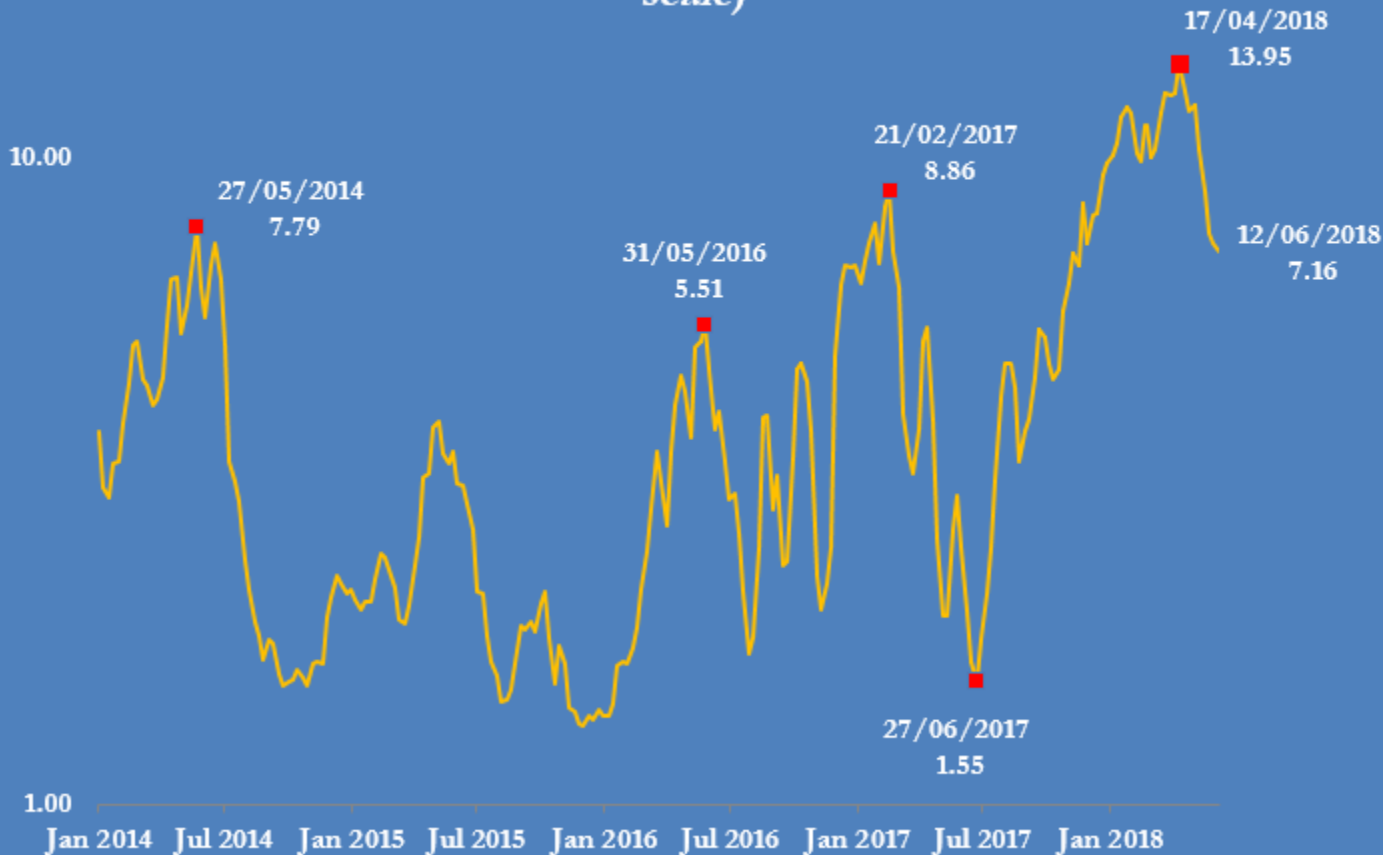


Source: U.S. Commodity Futures Trading Commission, ICE Futures Europe

Hedge funds were never before so overwhelmingly bullish

Crowded trade risks sharp reversal if/when funds try to realise profits

Ratio of money manager long to short positions in petroleum (Brent+WTI+gasoline+heating oil+ gasoil) (*log-scale*)

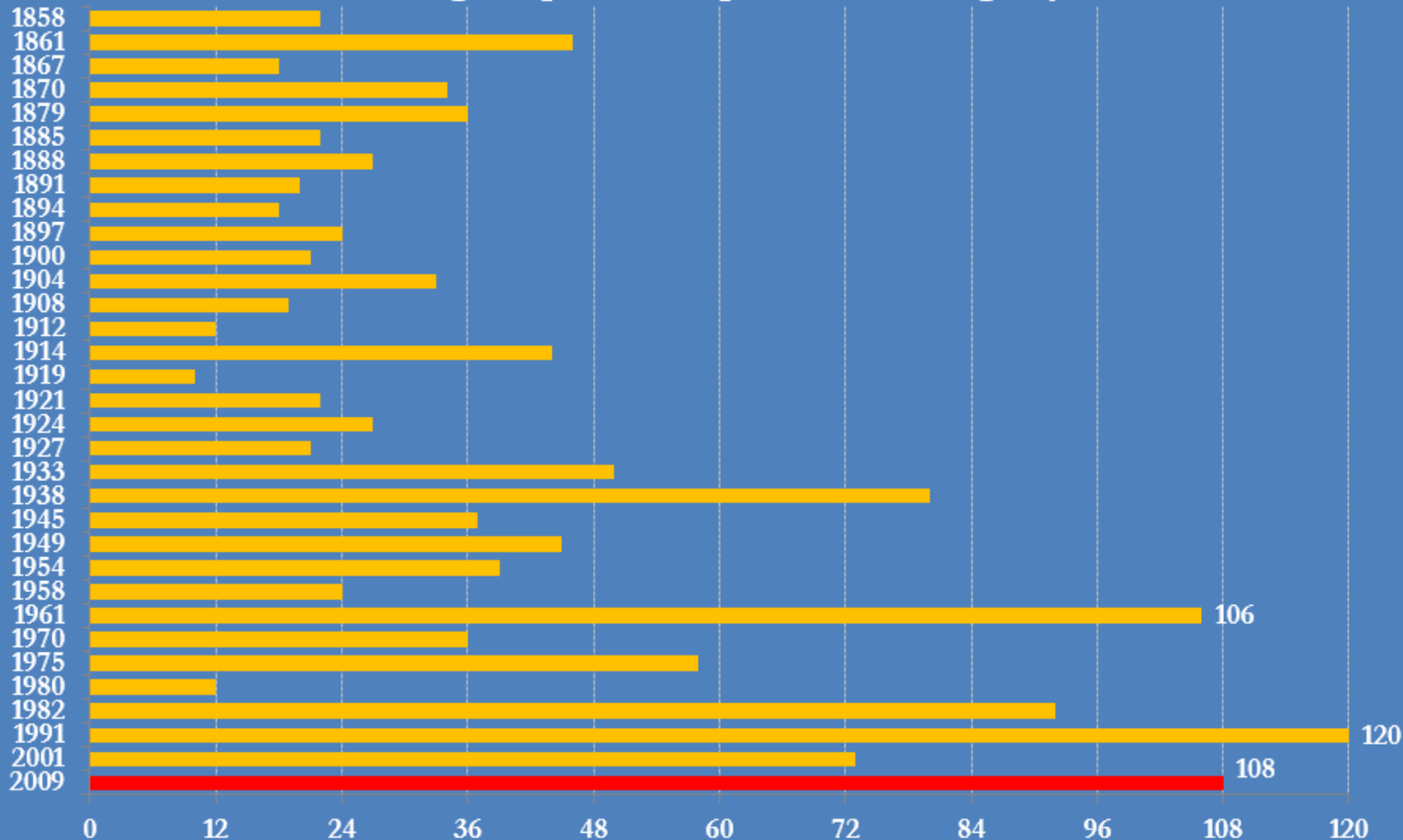


Source: U.S. Commodity Futures Trading Commission, ICE Futures Europe

U.S. macroeconomy now at relatively late stage in cycle

Economic downturn in the advanced economies is key risk for oil in 2019-2021

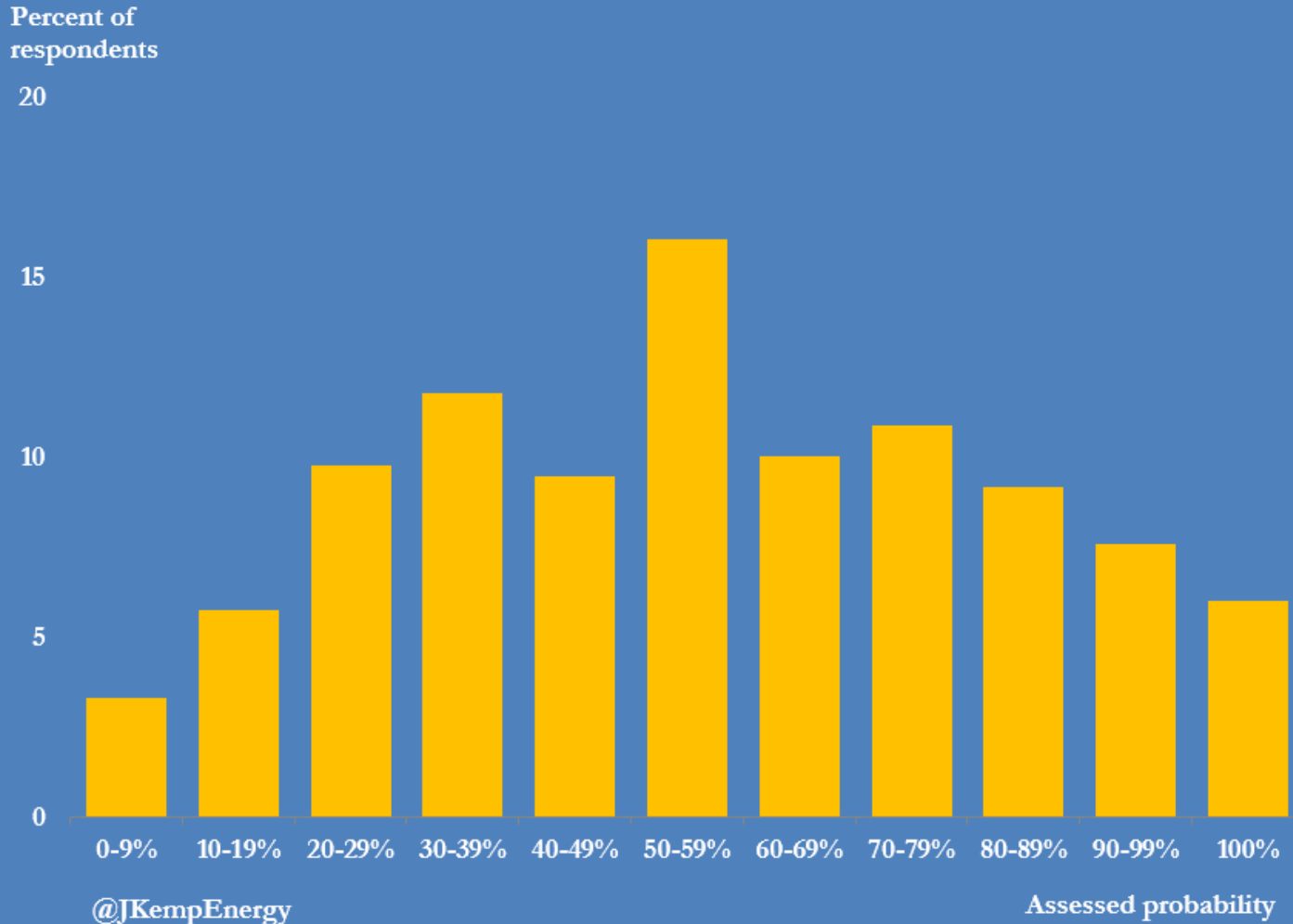
Duration of U.S. business cycles (expansion phase) since 1858
months from trough to peak for expansions starting in years shown



Half of energy professionals expect recession before end 2020

Based on a survey conducted at the start of Apr

Probability United States will enter recession before end 2020
Distribution of responses



Warning from Rex

Predictions notoriously unreliable, better to focus on coping strategies

Former Exxon Mobil Chief Executive Rex Tillerson (2 March 2016):

“We’ve never been any good at predicting these [price] cycles, neither when they occur nor their duration. We don’t spend a lot of time even trying.

“How the future is going to look, we take no particular view on it, other than to recognize that whatever it is today it will be different sometime in the future, and after that it will be different again.

“In my nearly 41 years [with Exxon], that’s been my experience. I didn’t learn anything about my ability to foresee that. I learned a lot about how you deal with it”

Fossil fuels and climate change

- Paris accord commits governments to keep global warming to less than 2° C
- Unburnable carbon and need to transition from fossil fuels to other energy

Grand energy transitions

- Historical transitions from wood → coal → oil → (nuclear?) → gas → renewables
- Transitions take a long time because of the capital intensity of the energy system
- Coal did not overtake wood as dominant energy source until **END** of 19th century
- Oil does not overtake coal as dominant energy source until 1950s
- Old energy sources can continue growing in **ABSOLUTE** terms even as they decline in **RELATIVE** terms
- Fossil fuel consumption is likely to continue rising throughout 2020s, probably 2030s and maybe even 2040s
- Question is not whether we miss the 2° C target but by how much?
- Fossil fuels **AND** renewable energy will **BOTH** be needed in increasing amounts for at least next 10-20 years

Electrification and decarbonisation

- Climate policy envisages two transitions
- Electricity to replace direct oil/gas/coal combustion in the energy system (“electrification”)
- Electricity to be decarbonised with renewables replacing fossil fuels as main source of generation (“decarbonisation”)
- Redesign of traditional power generation model
- Intermittent renewables (solar, wind) replace despatchable fossil fuels (coal, gas)
- Gas-fired generation as a back up to renewables
- Gas as a “bridging fuel”
- What role for carbon, capture and storage?
- Electricity storage
- Distributed generation
- Demand response
- Smart meters and variable electricity pricing