

BP Statistical Review of World Energy June 2017



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66th edition

For 66 years, the *BP Statistical Review of World Energy* has provided high-quality objective and globally consistent data on world energy markets. The review is one of the most widely respected and authoritative publications in the field of energy economics, used for reference by the media, academia, world governments and energy companies. A new edition is published every June.

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Group chief executive's introduction



Welcome to BP's *Statistical Review of World Energy*. This is the 66th edition of the Statistical Review and the data and analysis it contains provide a window onto another fascinating year in the world of energy.

Global energy markets are in transition. Rapid growth and improving prosperity mean growth in energy demand is increasingly coming from developing economies, particularly within Asia, rather than from traditional markets in the OECD. The relentless drive to improve energy efficiency is causing global energy consumption overall to decelerate. And, of course, the energy mix is shifting towards cleaner, lower carbon fuels, driven by environmental needs and technological advances. BP will play its part in meeting this dual challenge of supplying the energy the world needs to grow and prosper, while also reducing carbon emissions.

As well as the increasing pull of this long-term transition, energy markets last year also had to respond to a series of shorter-run factors, most notably in the oil market which continued to adjust to the excess supply that has weighed on prices over the past three years. To understand this mix of short and long-run factors and what they might

imply for the future, we need timely and reliable data. That is where the Statistical Review comes in, providing accurate global data to inform discussion, debate and decision making.

Looking at the picture overall, energy consumption grew slowly again in 2016 – the third consecutive year in which demand has grown by 1% or less – much weaker than the rates of growth we had become used to over the previous 10 years or so. Moreover, the weak growth in energy demand, combined with a continuing shift towards lower carbon fuels, meant global carbon emissions from energy consumption were estimated to have been essentially flat in 2016 for a third consecutive year – a substantial improvement relative to past trends.

From a global level, much of this improvement can be traced back to the pronounced changes in the pace and pattern of economic growth and energy consumption within China. The extent to which these changes will persist as China moves to a more sustainable pattern of growth and how much will unwind as the marked weakness in some of China's most energy-intensive sectors eases is uncertain. We need to keep up our focus and efforts on reducing carbon emissions. BP supports the aims set out in the COP21 meetings in Paris and is committed to playing its part in helping to achieve them.

In terms of individual fuels, 2016 was a year of adjustment for the oil market, with low prices fuelling demand growth and weighing on production, particularly US tight oil which fell back substantially. As a result, the oil market moved broadly into balance in the second half of the year, albeit with inventories remaining at elevated levels. Towards the end of last year, OPEC together with 10 non-OPEC producers announced an agreement to cut output in order to speed up the pace at which oil stocks adjust to more normal levels. The price responsiveness of US tight oil and the actions of OPEC dominated oil markets in 2016 and look set to continue to do so over the next few years.

The weak price environment in 2016 was also felt in the natural gas market, where global production was essentially flat. This is the weakest growth in gas output for 34 years, other than in the immediate aftermath of the financial crisis. Even so, exports of liquefied natural gas (LNG) increased strongly, as a number of major LNG projects in Australia came onstream. The growth spurt in LNG supplies expected

over the next few years is likely to have a major influence on global gas markets, leading to greater integration of markets across the globe and a move towards more flexible, competitive markets.

The influence of the energy transition was particularly marked in the contrasting fortunes of coal and renewable energy. Coal consumption fell sharply for the second consecutive year, with its share within primary energy falling to its lowest level since 2004. Indeed, coal production and consumption in the UK completed an entire cycle, falling back to levels last seen almost 200 years ago around the time of the Industrial Revolution, with the UK power sector recording its first ever coal-free day in April of this year. In contrast, renewable energy globally led by wind and solar power grew strongly, helped by continuing technological advances. Although the share of renewable energy within total energy remains small, at around 4%, it accounted for almost a third of the increase in primary energy last year.

Our industry has faced some significant challenges in recent years. There are signs in last year's data that markets are adjusting and some of the near-term pressures may gradually ease. But as we know from history, one set of challenges is likely to be replaced by another, as we learn to operate in ever-changing markets and to harness the opportunities afforded by the transition to a lower carbon environment. That will require understanding and judgement, both of which rely on the kind of robust data and analysis provided by the Statistical Review. I hope you find it a useful resource for your own discussions and deliberations.

Let me conclude by thanking BP's economics team and all those who helped us prepare this Review. The Review relies on the willingness of governments around the world to contribute their official data. Thank you for your continuing co-operation and transparency.

A handwritten signature in black ink that reads "Bob Dudley". The signature is written in a cursive, slightly slanted style.

Bob Dudley
Group chief executive
June 2017

2016 at a glance

Growth in global primary energy consumption remained low in 2016; and the fuel mix shifted away from coal towards lower carbon fuels.

Energy developments

- Global primary energy consumption increased by just 1% in 2016, following growth of 0.9% in 2015 and 1% in 2014. This compares with the 10-year average of 1.8% a year.
- As was the case in 2015, growth was below average in all regions except Europe & Eurasia. All fuels except oil and nuclear power grew at below-average rates.
- Energy consumption in China grew by just 1.3% in 2016. Growth during 2015 and 2016 was the lowest over a two-year period since 1997-98. Despite this, China remained the world's largest growth market for energy for a 16th consecutive year.

Carbon emissions

- Emissions of CO₂ from energy consumption increased by only 0.1% in 2016. During 2014-16, average emissions growth has been the lowest over any three-year period since 1981-83.

Oil

- The Dated Brent oil price averaged \$43.73 per barrel in 2016, down from \$52.39 per barrel in 2015 and its lowest (nominal) annual level since 2004.
- Oil remained the world's leading fuel, accounting for a third of global energy consumption. Oil gained global market share for the second year in a row, following 15 years of declines from 1999 to 2014.
- Global oil consumption growth averaged 1.6 million barrels per day (Mb/d), or 1.6%, above its 10-year average (1.2%) for the second successive year. China (400,000 b/d) and India (330,000 b/d) provided the largest increments.
- Global oil production in contrast, rose by only 0.4 Mb/d, the slowest growth since 2013.
- Production in the Middle East rose by 1.7 Mb/d, driven by growth in Iran (700,000 b/d) Iraq (400,000 b/d) and Saudi Arabia (400,000 b/d).

+1.0%

Growth of global primary energy consumption, well below the 10-year average of 1.8%.



Aerial view of Shanghai highway in China at night. Shanghai has an expansive grade-separated highway and expressway network consisting of 16 municipal express roads, 10 provincial-level expressways and eight national-level expressways.

- Production outside the Middle East fell by 1.3 Mb/d, with the largest declines in the US (-400,000 b/d), China (-310,000 b/d) and Nigeria (-280,000 b/d).
- Refinery throughput growth slowed from 1.8 Mb/d in 2015 to 0.6 Mb/d last year. Refining capacity grew by only 440,000 b/d, versus 10-year average growth of 1 Mb/d, causing refinery utilization to rise.

Natural gas

- World natural gas consumption grew by 63 billion cubic metres (bcm) or 1.5%, slower than the 10-year average of 2.3%.
- EU gas consumption rose sharply by 30 bcm, or 7.1% – the fastest growth since 2010. Russia saw the largest drop in consumption of any country (-12 bcm).
- Global natural gas production increased by only 21 bcm, or 0.3%. Declining production in North America (-21 bcm) partially offset strong growth from Australia (19 bcm) and Iran (13 bcm).
- Gas trade grew by 4.8%, helped by 6.2% growth in LNG imports/exports.
- Most of the net growth in LNG exports came from Australia (19 bcm out of 21). US LNG exports rose from 0.7 bcm in 2015 to 4.4 bcm in 2016.

Coal

- Global coal consumption fell by 53 million tonnes of oil equivalent (mtoe), or 1.7%, the second successive annual decline.

- The largest declines in coal consumption were seen in the US (-33 mtoe, an 8.8% fall) and China (-26 mtoe, -1.6%). Coal consumption in the UK more than halved (down 52.5%, or 12 mtoe) to its lowest level in our records.
- Coal's share of global primary energy consumption fell to 28.1%, the lowest share since 2004.
- World coal production fell by 6.2%, or 231 mtoe, the largest decline on record. China's production fell by 7.9% or 140 mtoe, also a record decline. US production fell by 19% or 85 mtoe.

Renewables, hydro & nuclear energy

- Renewable power (excluding hydro) grew by 14.1% in 2016, below the 10-year average, but the largest increment on record (53 mtoe).
- Wind provided more than half of renewables growth, while solar energy contributed almost a third despite accounting for only 18% of the total.
- Asia Pacific overtook Europe & Eurasia as the largest producing region of renewable power. China overtook the US to be the largest single renewables producer.
- Global nuclear power generation increased by 1.3% in 2016, or 9.3 mtoe. China accounted for all of the net growth, expanding by 24.5%. China's increment (9.6 mtoe) was the largest of any country since 2004.
- Hydroelectric power generation rose by 2.8% in 2016, (27.1 mtoe). China (10.9 mtoe) and the US (3.5 mtoe) provided the largest increments. Venezuela experienced the largest decline (-3.2 mtoe).

Group chief economist's analysis



Energy in 2016: short-run adjustments and long-run transition.

Stability and energy markets don't go together – booms and busts; rebounds and reversals are the norm.

But the movements and volatility seen last year were particularly interesting since energy markets were buffeted by two separate forces: the continued adjustment to the short-run cyclical shocks that have rocked energy markets in recent years, particularly the oil market; and the growing gravitational pull of the longer-run energy transition that is under way.

In recent years the nature of the cyclical adjustments has been increasingly affected by the longer-run transition that is shaping global energy markets. On the demand side: the shift in the centre of gravity to fast-growing developing economies, led by China and India; together with a slowing in overall energy growth as it is used ever more efficiently. And on the supply side, the secular movement towards cleaner, lower carbon energy sources, led by renewable energy, driven by technological advances and environmental needs.

2016 was a year of both short-run adjustments and long-run transition, and this year's Statistical Review shines a light on both influences.

+1.3%

Growth of primary energy consumption in China, a quarter of its 10-year average.

Key features of 2016

Primary energy grew by just 1% (171 mtoe) in 2016, almost half the average rate seen over the previous 10 years.

Some of this weakness reflected short-run factors: global GDP grew by just 3% last year, its slowest rate since 2002 – other than at the time of the financial crisis – driven in part by a slowdown in industrial production, the most energy-intensive sector of the economy.

But the weakness is also indicative of the longer-run trend towards slower energy growth driven by gains in energy efficiency.

This is the third consecutive year in which energy consumption has grown by 1% or less, with energy intensity – the average amount of energy needed to produce a unit of GDP – falling at historically unprecedented rates.

Growth in energy consumption was again driven by the developing economies. China (1.3%, 47 mtoe) and India (5.4%, 39 mtoe) led the way, contributing almost identical increments, and together accounting for around half of the increase in global demand.

But these similar contributions disguise sharply contrasting trends. India's energy consumption grew at a similar rate to the recent past, underpinned by solid economic growth. In contrast, China's energy consumption grew at less than a quarter of the rate seen over the previous 10 years.

This brake in China's energy consumption partly reflects the gradual slowing in economic growth, but it has been greatly compounded by pronounced weakness in China's most energy-intensive sectors, particularly iron, steel and cement, which together account for around a quarter of China's total energy consumption.

Some of the weakness in these sectors, which drove China's rapid growth and industrialization over much of the past 15 years, reflects the structural rebalancing of the economy towards more consumer and service facing sectors.

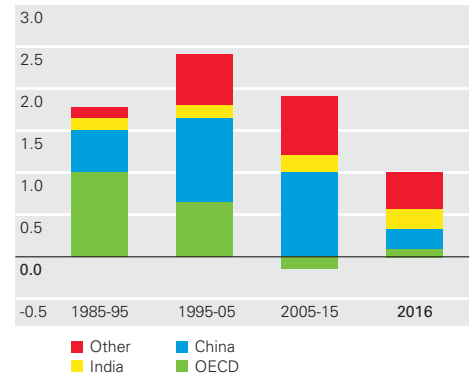
But the scale of the slowdown – with output in iron, steel and cement below 2014 levels – suggests that some bounce-back is perhaps likely.



The Beijing central business district is the primary area of finance, media, and business services in Beijing, China.

Energy consumption growth

Contributions to annual growth, %



Short-run adjustments and long-run transition.

The story in terms of individual fuels also reflects a mix of these two forces.

Renewable energy (including biofuels) (12%, 55 mtoe) was again the fastest growing energy source, accounting for almost a third of the increase in primary energy, despite having a share of only 4%. That said, oil (1.5%, 75 mtoe) actually provided the largest contribution to growth, with the low level of oil prices boosting demand.

Natural gas (1.5%, 57 mtoe) grew at the same rate as oil, although for gas this was considerably slower than its 10-year average.

Perhaps the most striking feature across the different fuels was the continuing rapid descent of coal, with consumption (-1.7%, -53 mtoe) falling sharply for the second consecutive year and the share of coal within primary energy declining to its lowest level since 2004.

The turnaround in the fortunes of coal over the past few years is stark: it is only four years ago that coal was the largest source of energy demand growth. There may be further ups and downs in the fortunes of coal over coming years, but the weakness in recent years does seem to signal a fairly decisive break from the past.

Oil

Two years ago, 2015 was a year of thwarted adjustment for oil: strong growth in OPEC production outweighed the responses of both demand and non-OPEC production to lower prices.

In contrast, 2016 was a year of adjustment for the oil market, with oil demand again increasing robustly and production growing by less than a quarter (0.4 Mb/d) of that seen in 2015.

Global oil demand grew by 1.6 Mb/d last year. As in 2015, this strength was almost entirely due to oil importers, with both India (0.3 Mb/d) and Europe (0.3 Mb/d) posting unusually strong increases. Although, growth in China (0.4 Mb/d) and the US (0.1 Mb/d) was more subdued.

As in 2015, the strength in oil demand was most pronounced in consumer-led fuels, such as gasoline, buoyed by low prices. In contrast, diesel demand, which was more exposed to the industrial slowdown, including in the US and China, declined for the first time since 2009.

The weakness on the supply side was driven by non-OPEC production which fell by 0.8 Mb/d, its largest decline for almost 25 years. This fall was led by US tight oil, whose production fell 0.3 Mb/d, a swing of almost 1 Mb/d relative to growth in 2015. China also experienced its largest ever decline in oil production (-0.3 Mb/d).

In contrast, OPEC production recorded another year of solid growth (1.2 Mb/d), with Iran (0.7 Mb/d), Iraq (0.4 Mb/d) and Saudi Arabia (0.4 Mb/d) more than accounting for the increase. Iran's production and its share of OPEC output are now both back around pre-sanction levels.

The combination of strong demand and weak supply was sufficient to move the oil market broadly back into balance by the middle of the year.

But this was not before inventories had increased even further from their already excessive levels, such that the level of OECD inventories by the end of 2016 was around 300 Mbbls above their five-year average.

The drama and intrigue that has characterized oil markets since the price collapse in 2014 have been dominated by two principal actors: US tight oil and OPEC. What have we learnt about the behaviour of both during this cycle?

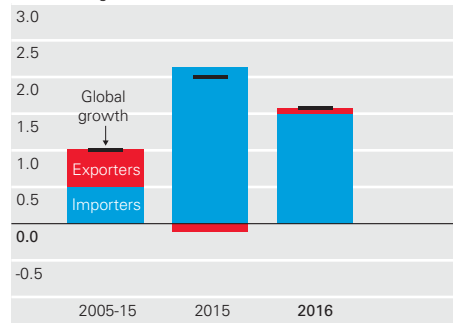
Consider first US tight oil, which didn't exist during the last oil price cycle, and so we are learning about it in real time.

Perhaps the most important thing is that there is no such thing as the behaviour of 'US tight oil': the

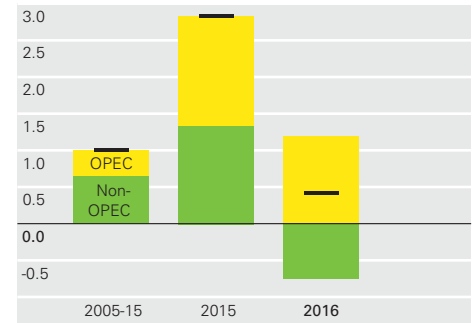
Oil market in 2015 and 2016

Consumption

Annual change, Mb/d



Production



Permian is very different to Eagle Ford which is different to Bakken. So beware generalizations.

Notwithstanding that, the short-cycle nature of fracking meant activity related to US tight oil did respond far more quickly to price signals than conventional oil and, in so doing, dampened price volatility. Rigs started to fall around four to six months after oil prices peaked in June 2014 and picked up even more quickly – within three or four months – once prices started to turn at the beginning of last year.

And this lower activity fed through into slower output growth. In the first half of 2015 – so less than a year after the peak in oil prices – tight oil production grew by just 0.1 Mb/d, compared with over 0.5 Mb/d in the same period a year earlier – a swing in annualized terms of 0.8 Mb/d. Similarly, US tight oil has grown solidly in the first half of this year, following the trough in prices in the spring of 2016.

The final point to note about US tight oil is that productivity continued to rise rapidly through the cycle, with new well production per rig increasing by around 40% per year in both 2015 and 2016. Despite rigs in the Permian falling by over 75%, output continued to grow. Put differently, a rig operating in the Permian today is equivalent to more than three rigs at the end of 2014.

So that is the backstory on one of the principal actors, what about the other: OPEC?

As with many great characters in literature, OPEC took some decisive actions which caught many observers by surprise and dramatically changed the course of events. First, by not cutting production in November 2014, triggering a collapse in prices, and then last November agreeing, along with 10 non-OPEC producers, to a production cut totalling 1.8 Mb/d.

How should we think about these actions?

For me, the clearest explanation of these actions was given by HE Khalid Al-Falih, the Saudi Arabian minister for energy, industry and mineral resources at CERAWEEK in March. To quote minister Al-Falih:

“OPEC remains an important catalyst to the stability and sustainability of the market... but history has also demonstrated that intervention in response to structural shifts is largely ineffective... that's why Saudi Arabia does not support OPEC intervening to alleviate the impacts of long-term structural imbalances, as opposed to addressing short-term aberrations....”

-0.8 Mb/d

Decline in non-OPEC oil production.



On board BP's Thunder Horse platform in the Gulf of Mexico, USA.

To unpack this a bit: OPEC's power stems from its ability to shift oil production from one period to another. As such, it has the ability to smooth through the effects of temporary shocks to the oil market, lowering or raising production until the shock subsides.

But its ability to respond to permanent shocks is far more limited: shifting supply from one period to another makes little difference if the underlying shock persists. Consider, for example, the unsuccessful attempts by OPEC to support the oil market in the first half of the 1980s as new structural sources of production from the North Sea and Alaska came onstream.

The underlying source of the supply imbalance that emerged in 2014 was the growth of US tight oil. To use the Minister's words, this was not a short-term aberration; it was the emergence of a new source of intra-marginal supply.

In contrast, the focus now is on increasing the pace at which the huge overhang of oil stocks is drawn down to more normal levels. This is exactly the type of temporary adjustment in which OPEC intervention can be effective – reducing supply until stocks have adjusted.

So perhaps like all the best stories, the actions of the main characters make perfect sense when seen in the right context. OPEC remains a central force, able to manage and stabilize the oil market, but the nature of that power means it is effective for short-term aberrations, not structural shifts.

Finally for oil, what has all this meant for prices?

The persistent supply imbalance and growing inventory levels caused prices to fall towards the end of 2015 and into 2016. Prices stabilized through the middle of the year as the market moved into balance and inventories levelled off, before firming somewhat towards the end of the year in the wake of the OPEC/non-OPEC agreement. Dated Brent averaged \$44 per barrel in 2016, down from \$52 in 2015, its lowest (nominal) average since 2004. So far, this year, prices have averaged about \$53 as the OPEC cuts have started to take effect, albeit partially offset by the strong recovery in US tight oil.

Refining

Back in 2015, refiners responded to near-record high margins by increasing refinery throughput by 1.8 Mb/d, triple its 10-year average.

That led to a build-up of product inventories that dampened margins in 2016, causing refineries to reduce the growth in crude runs to just 0.6 Mb/d.

After strong growth in 2015, European refiners reduced runs by 0.2 Mb/d, while runs in Mexico, Venezuela and Brazil fell by a combined 0.4 Mb/d due to multiple refinery shutdowns.

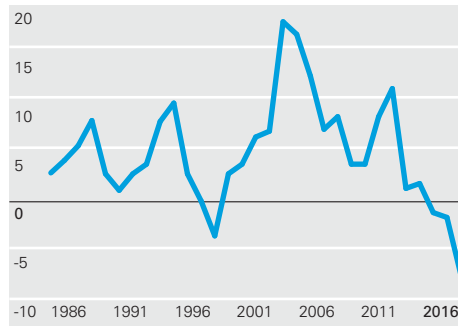
\$44/bbl

Price of Dated Brent crude oil.

China coal production and prices

China coal production growth

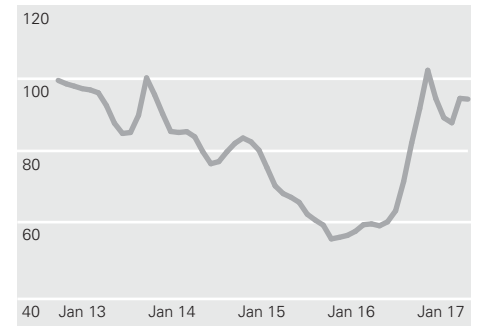
Annual change, %



China coal prices

\$/tonne

Qinhuangdao steam coal (5500 kcal/kg)



Refining capacity expanded by just 0.4 Mb/d, less than half its 10-year average. This was the second successive year of weak growth in refining capacity, much of which can be attributed to actions by China to limit the build-up of domestic spare refining capacity.

Coal

The fortunes of coal appear to have taken a decisive break from the past. This shift largely reflects structural factors: the increasing availability and competitiveness of natural gas and renewables, combined with government and societal pressure to shift towards cleaner, lower carbon fuels.

These long-term forces in turn have given rise to near-term tensions and dynamics. This was particularly the case in China, which at the beginning of the year introduced a series of measures to reduce the scale of excess capacity in the domestic coal sector and improve the productivity and profitability of the remaining mines.

These measures were focused on reducing capacity amongst the smallest, least productive mines and encouraging greater consolidation. In addition, the government further constrained production by restricting coal mines to operate for

a maximum of 276 days, down from 330 days. The impact of these measures was dramatic: domestic coal production fell sharply and prices jumped sharply higher. For 2016 as a whole, Chinese coal production fell by 7.9% (-140 mtoe), by far the largest decline on record, and through the year the price of steam coal increased by over 60%. Coal consumption also declined (-1.6%, -26 mtoe) for the third consecutive year, although by less than production, with China resuming its position as the world's largest importer of coal.

The events in China spilled over into global coal markets, with world prices taking their cue from China. This rise in global coal prices further depressed global coal demand, particularly in power sector around the globe, with natural gas and renewable energy the main beneficiaries. Global coal consumption fell by 53 mtoe (-1.7%) and global production by a whopping 231 mtoe (-6.2%), with US production registering a second consecutive substantial fall (-19.0%, -85 mtoe).

A particularly striking example of this long-run movement away from coal was here in the UK, where the hike in global coal prices was amplified by the increase in the UK's Carbon Price Floor in 2015. As a result, the UK's relationship with coal almost completed an entire cycle: with the UK's last three underground coal mines closing,



Surface coal mine in England.

consumption falling back to where it was roughly 200 years ago around the time of the industrial revolution, and the UK power sector recording its first-ever coal-free day in April of this year.

Natural gas

Global consumption increased by 1.5% (63 bcm), quite a bit weaker than its 10-year average (2.3%); while global gas production was essentially flat (0.3%, 21 bcm), the weakest growth in gas output for 34 years, other than in the immediate aftermath of the financial crisis.

This sub-par growth went hand-in-hand with falling gas prices – Henry Hub prices were 5% lower than in 2015, European and Asian gas markers were down 20-30% as prices continued to adjust to increased LNG supplies.

Much of the lacklustre performance can be traced back to the US, particularly on the supply side where falls in gas (and oil) prices caused US gas production (-17 bcm, -2.5%) to fall for the first time since the US shale gas revolution started in earnest in the mid-2000s.

Outside of the US, on the demand side, gas consumption in Europe rose strongly (6%, 28 bcm) helped by both the increasing competitiveness of gas relative to coal and weakness in European nuclear and renewable energy.

The Middle East (3.5%, 19 bcm) and China (16 bcm, 7.7%) both also recorded strong increases aided by improving infrastructure and availability of gas. The largest falls were in Russia (-12 bcm, -3.2%) and Brazil (-5 bcm, -12.5%) both of which benefited from strong increases in hydropower.

On the supply side, Australian production (19 bcm, 25.2%) was the standout performer as several new LNG facilities came onstream.

Looking at the growing market for LNG, although China continued to provide the main source of growth, it's striking that the increasing availability of supplies has prompted a number of new countries, including Egypt, Pakistan and Poland, to enter the market in the last year or two. These new entrants were helped by the increased flexibility afforded by plentiful supplies of FSRUs (floating storage and regasification units).

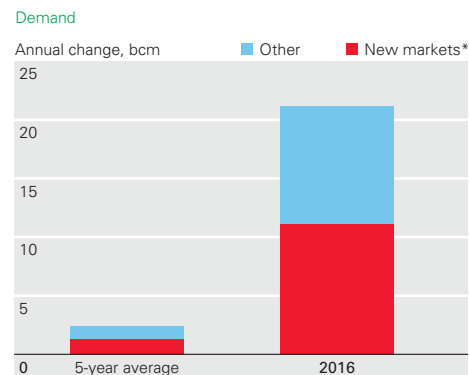
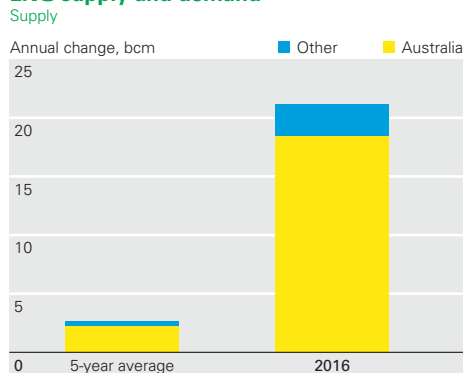
2016 was the first year of the growth spurt we expect to see in LNG, with global supplies set to increase by around a further 30% by 2020. That is equivalent to a new LNG train coming onstream every two-to-three months for the next four years – quite astonishing growth.

As the importance of LNG trade grows, global gas markets are likely to evolve quite materially.

25.2%

Increase in Australian natural gas production as new LNG facilities came onstream.

LNG supply and demand



*Includes Egypt, Pakistan, Poland, Jamaica, Colombia and Lithuania

Alongside increasing market integration, we are likely to see a shift towards a more flexible style of trading, supported by a deeper, more competitive market structure. Indeed, this shift is already apparent, with a move towards smaller and shorter contracts and an increase in the proportion of LNG trade which is not contracted and is freely traded.

A particularly interesting market in the context of the growing LNG supplies is Europe.

On the one hand, Europe's large and increasing need for imported gas, combined with its relatively central location amongst several major LNG suppliers, means Europe is often highlighted as a natural growth market for LNG. On the other hand, Europe's access to plentiful supplies of pipeline gas, particularly from Russia, means LNG imports are likely to face stiff competition.

In terms of this battle of competing supplies, Round 1 went to pipeline gas.

Europe's gas imports increased markedly last year, reflecting the strong increase in demand, together with weakness in the domestic production of natural gas. But virtually the entire rise in European imports was met by pipeline gas, from a combination of Algerian and Russian supplies, with imports of LNG barely increasing.

The economic incentives in this battle of competing supplies are clear: just as with OPEC's response to the emergence of US tight oil, Russia has a strong incentive to compete to maintain its market share in the face of growing competition from LNG supplies.

But this competitive process is complicated by possible concerns about Europe being overly dependent on a single source of supply and the energy security issues this might raise. The interesting question is whether the growth of global LNG trade, by fostering a more globally-integrated gas market, with the optionality of being able to turn to LNG should the need arise, might mitigate those concerns.

Europe doesn't need to consume large amounts of LNG imports in 'normal' times, but it has the option of doing so if the need arises.

Non-fossil fuels

The leading light of the energy transition is, of course, renewable power which continued to grow rapidly last year, led by wind (15.6%, 131 TWh) and solar (29.6%, 77 TWh). Although the share of renewable power within primary energy edged up only slightly to 3.2%, its strong growth meant it accounted for over 30% of the increase in primary energy.



The Trans-Anatolian Natural Gas Pipeline in Turkey, a central part of the Southern Gas Corridor pipeline system.

China continued to dominate renewables growth, contributing over 40% of global growth – more than the entire OECD – and surpassing the US to become the largest producer of renewable power.

One noticeable weak spot last year was the EU, where renewable power barely grew as load factors fell back from unusually high levels in 2015. This is a reminder of the variability that weather conditions can inject into renewable generation from year to year. For example, the decline in Denmark's wind power last year was almost 5% of its total power generation.

Although wind continued to provide the lion's share of the increase in renewable power, solar is catching up fast.

The right-hand chart considers the 67 countries that are separately tracked in the Statistical Review and records the share of those countries that, in any given year, produced a material amount of different energies. It took around 20 years for the share of countries producing a sizeable amount of wind power to increase from 15% to 75%; solar achieved the same degree of diffusion in less than half that time. In sharp contrast, nuclear energy plateaued at less than half the number of countries.

These different rates of diffusion reflect the different characteristics of the technologies: the more modular nature of solar power, together with its steeper learning curve has allowed it to spread more quickly.

Moreover, the fact that the transfer of wind and solar technology is not subject to onerous security restrictions has helped their rapid diffusion relative to nuclear power.

In terms of other non-fossil fuels: China provided the main source of world growth for both hydro (2.8%, 120 TWh) and nuclear (1.3%, 41 TWh) power. Growth in China's hydro power has slowed sharply in recent years from the rapid rates of expansion that characterized the first part of the 2000s. In contrast, China's nuclear programme is just beginning to ramp up: it brought on five new reactors last year – the largest ever annual increase in China's nuclear history – and has more than 20 reactors currently under construction.

Carbon emissions

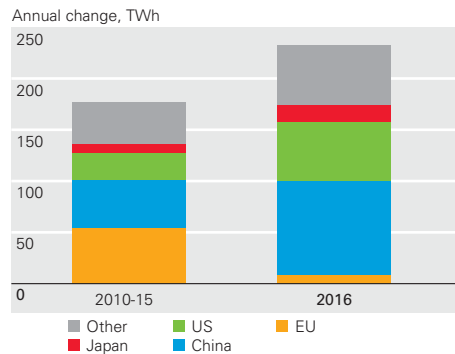
Turning finally to carbon emissions. The good news is that carbon emissions were essentially flat in 2016. This is the third consecutive year in which we have seen little or no growth in carbon emissions – in sharp contrast to the 10 years before that, in which emissions grew by almost

In detail

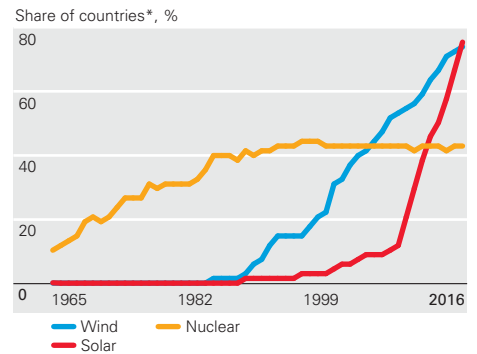
Additional information – including historical time series for the fuels reported in this review; further detail on renewable forms of energy; oil consumption by product – together with the full version of Spencer Dale's presentation is available at bp.com/statisticalreview

Growth and diffusion of renewables

Growth by country



Diffusion of power technologies



*The proportion of the 67 countries that are individually listed in the Statistical Review with power generation of at least 50 GWh from the specified technology.

2.5% per year. Some of this slowdown reflects weaker GDP growth, but the majority reflects faster declines in the carbon intensity of GDP – the average amount of carbon emitted per unit of GDP – driven by accelerating improvements in both energy efficiency and the fuel mix.

The key question this raises is whether the experience of the past three years signals a decisive break from the past and a significant step towards the goals of Paris or was it largely driven by cyclical factors which are likely to unwind over time?

Long-run transition or short-run adjustment?

Looking at the factors driving this improvement, the key difference is China. China's carbon emissions are estimated to have actually fallen over the past two years, after growing by more than 75% in the previous 10 years.

As mentioned earlier in the context of the slowdown in China's energy consumption, there are good reasons for thinking that some of this improvement in China's carbon emissions reflects

structural factors that are likely to persist: slower economic growth; a shift in the composition of growth towards less energy-intensive sectors, and a movement away from coal. But some probably reflects cyclical factors, particularly the contractions in some of China's most energy-intensive sectors, which are unlikely to keep being repeated and may well unwind in future years.

The juxtaposition of short-run adjustments and long-run transition is likely to be a feature of energy markets for many years to come.

Spencer Dale
Group chief economist
June 2017

This is a shortened version of the presentation given at the launch of BP's Statistical Review of World Energy in London on 13 June 2017.



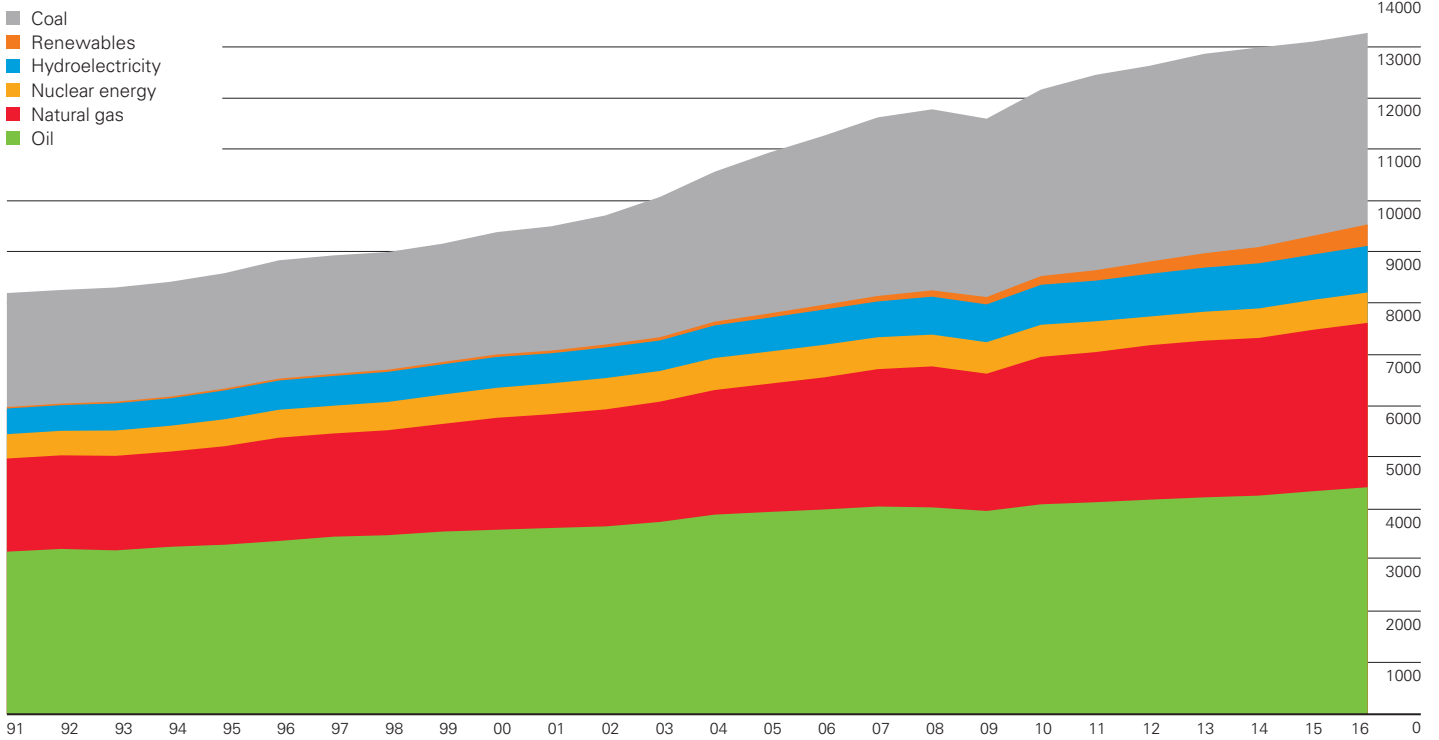
Aerial view of a field of solar panels in Italy.

Acknowledgements

We would like to express our sincere gratitude to the many contacts worldwide who provide the publicly available data for this publication, and to the researchers at the Centre for Energy Economics Research and Policy, Heriot-Watt University who assist in the data compilation.

World consumption

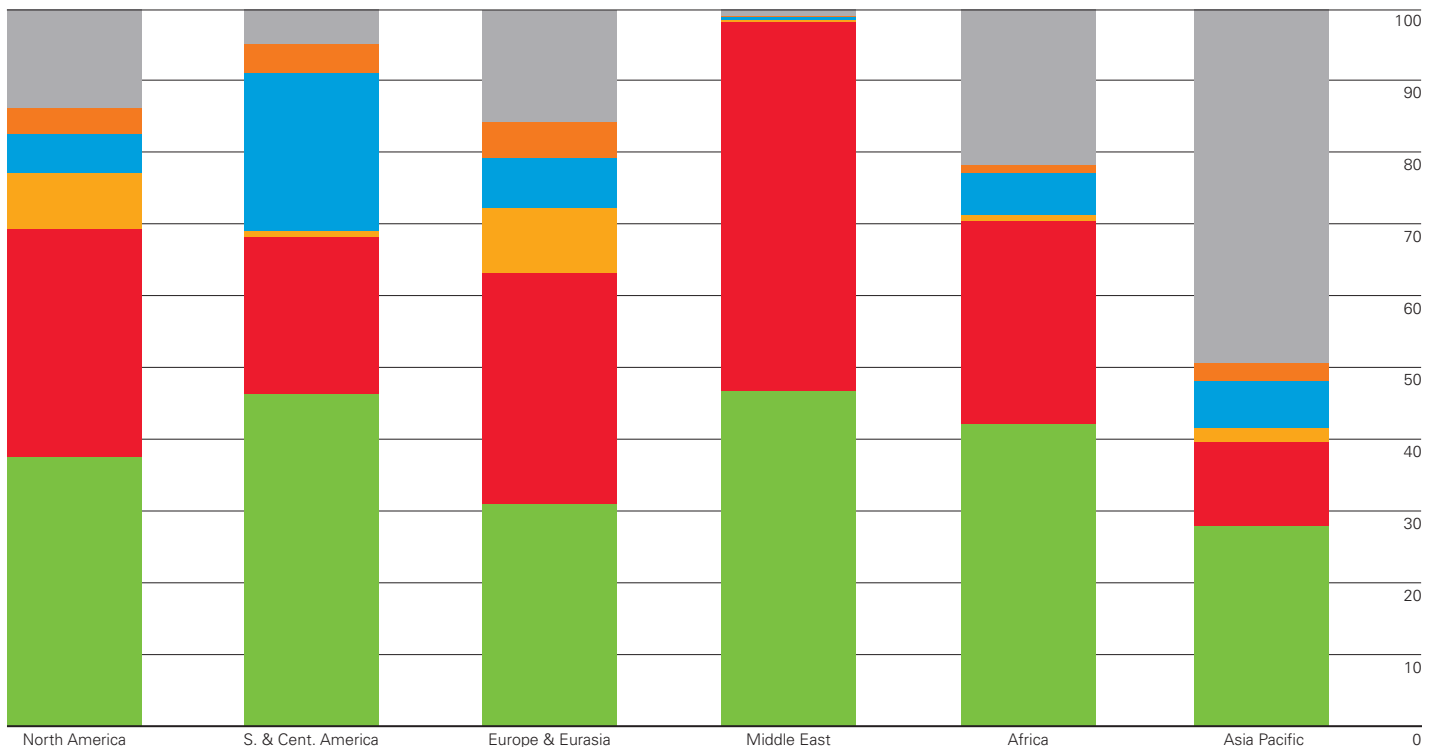
Million tonnes oil equivalent



World primary energy consumption grew by 1.0% in 2016, well below the 10-year average of 1.8% and the third consecutive year at or below 1%. As was the case in 2015, growth was below average in all regions except Europe & Eurasia. All fuels except oil and nuclear power grew at below-average rates. Oil provided the largest increment to energy consumption at 77 million tonnes of oil equivalent (mtoe), followed by natural gas (57 mtoe) and renewable power (53 mtoe).

Regional consumption by fuel 2016

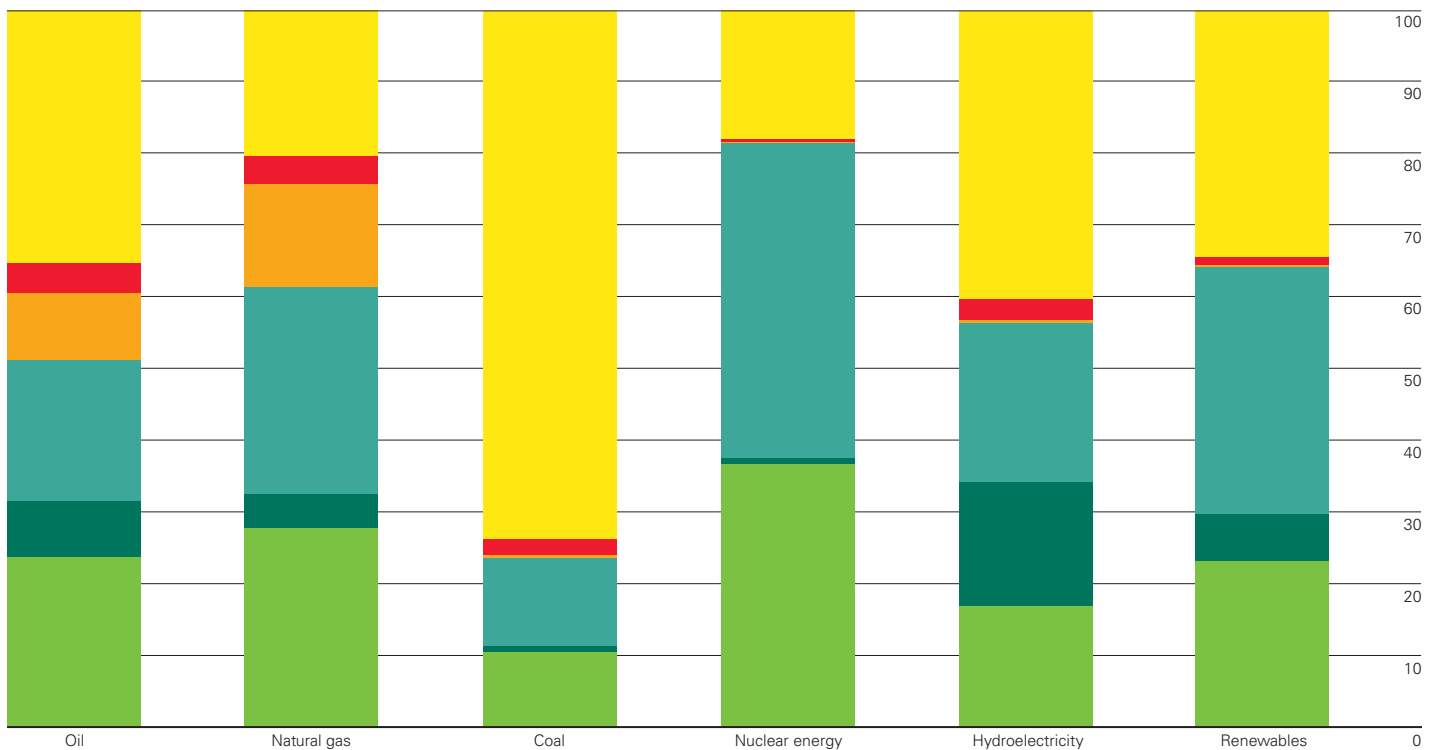
Percentage



Oil remains the dominant fuel in Africa and the Americas, while natural gas dominates in Europe & Eurasia and the Middle East. Coal is the dominant fuel in the Asia Pacific region, accounting for 49% of regional energy consumption. In 2016, coal's share of primary energy fell to its lowest level in our data series in North America, Europe & Eurasia and Africa.

Fuel consumption by region 2016

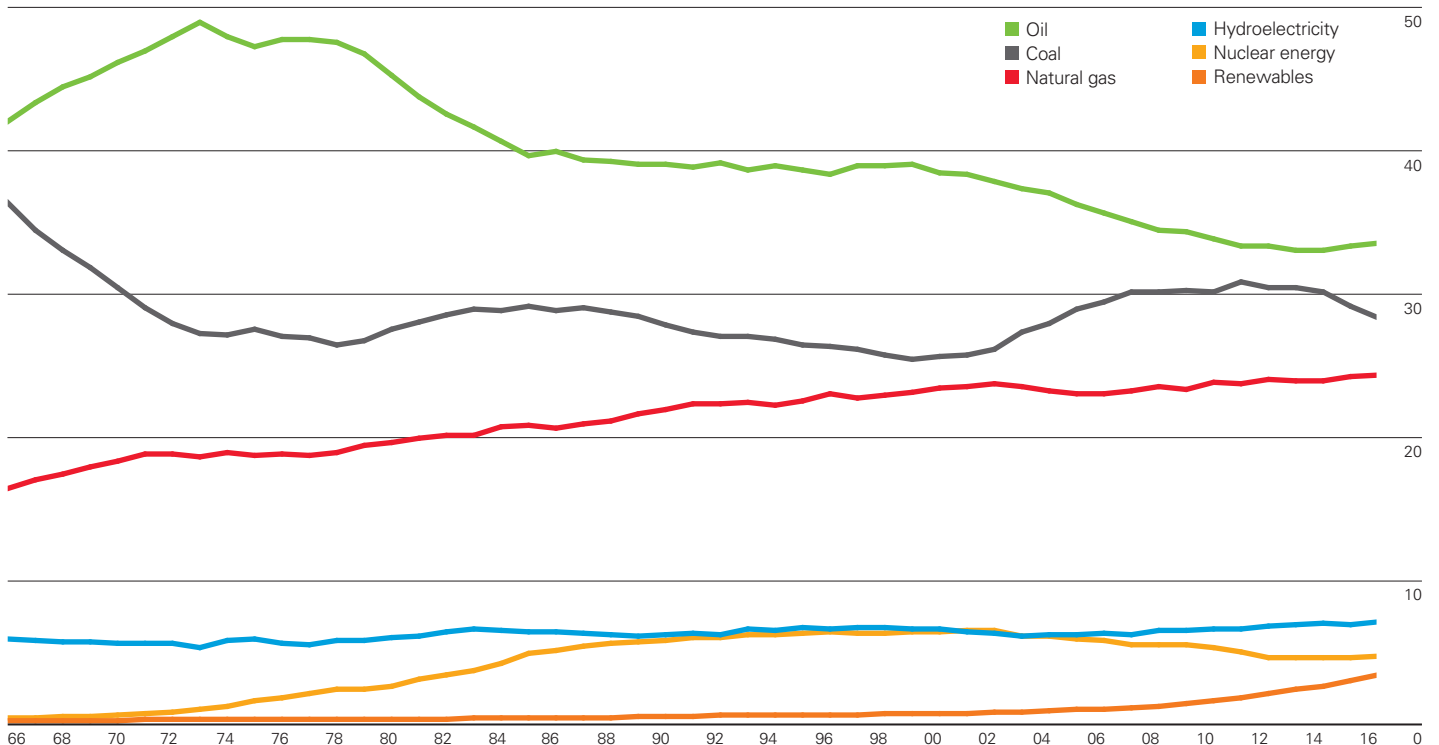
Percentage



Asia is the leading consumer of oil, coal, hydroelectricity and for the first time in 2016, the leading consumer of renewables in power generation, overtaking Europe & Eurasia. Europe & Eurasia remains the leading consumer of natural gas and nuclear power. Asia dominates global coal consumption, accounting for almost three quarters of global consumption (73.8%).

Shares of global primary energy consumption

Percentage



Oil remains the world's dominant fuel, making up roughly a third of all energy consumed. In 2016 oil gained global market share for the second year in a row, following 15 years of declines from 1999 to 2014. Coal's market share fell to 28.1%, the lowest level since 2004. Renewables in power generation accounted for a record 3.2% of global primary energy consumption.

Total proved reserves

	At end 1996 Thousand million barrels	At end 2006 Thousand million barrels	At end 2015 Thousand million barrels	At end 2016			
				Thousand million barrels	Thousand million tonnes	Share of total	R/P ratio
US	29.8	29.4	48.0	48.0	5.8	2.8%	10.6
Canada	48.9	179.4	171.5	171.5	27.6	10.0%	105.1
Mexico	48.5	12.8	8.0	8.0	1.1	0.5%	8.9
Total North America	127.3	221.7	227.5	227.5	34.5	13.3%	32.3
Argentina	2.6	2.6	2.4	2.4	0.3	0.1%	10.6
Brazil	6.7	12.2	13.0	12.6	1.8	0.7%	13.3
Colombia	2.8	1.5	2.3	2.0	0.3	0.1%	5.9
Ecuador	3.5	4.5	8.0	8.0	1.2	0.5%	40.1
Peru	0.8	1.1	1.2	1.2	0.1	0.1%	24.0
Trinidad & Tobago	0.7	0.8	0.7	0.2	†	♦	6.9
Venezuela	72.7	87.3	300.9	300.9	47.0	17.6%	341.1
Other S. & Cent. America	1.0	0.8	0.5	0.5	0.1	♦	10.3
Total S. & Cent. America	90.7	110.8	329.0	327.9	50.8	19.2%	119.9
Azerbaijan	1.2	7.0	7.0	7.0	1.0	0.4%	23.1
Denmark	0.9	1.2	0.5	0.4	0.1	♦	8.5
Italy	0.8	0.5	0.6	0.5	0.1	♦	18.8
Kazakhstan	5.3	9.0	30.0	30.0	3.9	1.8%	49.0
Norway	11.7	8.5	8.0	7.6	0.9	0.4%	10.4
Romania	1.0	0.5	0.6	0.6	0.1	♦	20.7
Russian Federation	113.6	104.0	102.4	109.5	15.0	6.4%	26.6
Turkmenistan	0.5	0.6	0.6	0.6	0.1	♦	6.3
United Kingdom	5.0	3.6	2.5	2.5	0.3	0.1%	6.9
Uzbekistan	0.6	0.6	0.6	0.6	0.1	♦	29.3
Other Europe & Eurasia	2.4	2.2	2.1	2.1	0.3	0.1%	15.6
Total Europe & Eurasia	142.8	137.6	154.9	161.5	21.8	9.5%	24.9
Iran	92.6	138.4	158.4	158.4	21.8	9.3%	94.1
Iraq	112.0	115.0	142.5	153.0	20.6	9.0%	93.6
Kuwait	96.5	101.5	101.5	101.5	14.0	5.9%	88.0
Oman	5.3	5.6	5.3	5.4	0.7	0.3%	14.6
Qatar	3.7	27.4	25.2	25.2	2.6	1.5%	36.3
Saudi Arabia	261.4	264.3	266.6	266.5	36.6	15.6%	59.0
Syria	2.5	3.0	2.5	2.5	0.3	0.1%	273.2
United Arab Emirates	97.8	97.8	97.8	97.8	13.0	5.7%	65.6
Yemen	2.0	2.8	3.0	3.0	0.4	0.2%	*
Other Middle East	0.2	0.1	0.2	0.2	†	♦	2.6
Total Middle East	674.0	755.9	803.0	813.5	110.1	47.7%	69.9
Algeria	10.8	12.3	12.2	12.2	1.5	0.7%	21.1
Angola	3.7	9.0	11.8	11.6	1.6	0.7%	17.5
Chad	–	1.5	1.5	1.5	0.2	0.1%	56.1
Republic of Congo	1.6	1.6	1.6	1.6	0.2	0.1%	18.4
Egypt	3.8	3.7	3.5	3.5	0.5	0.2%	13.7
Equatorial Guinea	0.6	1.8	1.1	1.1	0.1	0.1%	10.7
Gabon	2.8	2.2	2.0	2.0	0.3	0.1%	24.1
Libya	29.5	41.5	48.4	48.4	6.3	2.8%	310.1
Nigeria	20.8	37.2	37.1	37.1	5.0	2.2%	49.3
South Sudan	n/a	n/a	3.5	3.5	0.5	0.2%	80.9
Sudan	0.3	5.0	1.5	1.5	0.2	0.1%	39.6
Tunisia	0.3	0.6	0.4	0.4	0.1	♦	18.4
Other Africa	0.7	0.7	3.7	3.7	0.5	0.2%	43.2
Total Africa	74.9	116.9	128.2	128.0	16.9	7.5%	44.3
Australia	3.8	3.5	4.0	4.0	0.4	0.2%	30.3
Brunei	1.1	1.2	1.1	1.1	0.1	0.1%	24.9
China	16.4	20.2	25.7	25.7	3.5	1.5%	17.5
India	5.5	5.7	4.8	4.7	0.6	0.3%	14.9
Indonesia	4.7	4.4	3.6	3.3	0.5	0.2%	10.3
Malaysia	5.0	5.4	3.6	3.6	0.5	0.2%	14.0
Thailand	0.2	0.5	0.4	0.4	†	♦	2.3
Vietnam	0.9	3.3	4.4	4.4	0.6	0.3%	36.2
Other Asia Pacific	1.3	1.4	1.3	1.3	0.2	0.1%	12.5
Total Asia Pacific	39.0	45.5	48.8	48.4	6.4	2.8%	16.5
Total World	1148.8	1388.3	1691.5	1706.7	240.7	100.0%	50.6
of which: OECD	151.0	240.2	244.5	244.0	36.6	14.3%	28.8
Non-OECD	997.8	1148.1	1447.0	1462.7	204.1	85.7%	57.9
OPEC	805.0	936.1	1210.3	1220.5	171.2	71.5%	84.7
Non-OPEC	343.8	452.2	481.1	486.2	69.6	28.5%	25.2
European Union#	8.7	6.6	5.2	5.1	0.7	0.3%	9.3
CIS	121.9	121.9	141.1	148.2	20.1	8.7%	28.6
Canadian oil sands: Total	42.1	173.1	165.3	165.3	26.9		
of which: Under active development	4.2	21.0	24.0	24.0	3.9		
Venezuela: Orinoco Belt	–	7.6	222.3	222.3	35.7		

*More than 500 years.

†Less than 0.05.

♦Less than 0.05%.

n/a not available.

#Excludes Estonia and Latvia in 2006.

Notes: Total proved reserves of oil – Generally taken to be those quantities that geological and engineering information indicates with reasonable certainty can be recovered in the future from known reservoirs under existing economic and operating conditions. The data series for total proved oil does not necessarily meet the definitions, guidelines and practices used for determining proved reserves at company level, for instance as published by the US Securities and Exchange Commission, nor does it necessarily represent BP's view of proved reserves by country. **Reserves-to-production (R/P) ratio** – If the reserves remaining at the end of any year are divided by the production in that year, the result is the length of time that those remaining reserves would last if production were to continue at that rate.

Source of data – The estimates in this table have been compiled using a combination of primary official sources, third-party data from the OPEC Secretariat, World Oil, Oil & Gas Journal and independent estimates of Russian reserves based on official data and Chinese reserves based on information in the public domain.

Canadian oil sands 'under active development' are an official estimate. Venezuelan Orinoco Belt reserves are based on the OPEC Secretariat and government announcements.

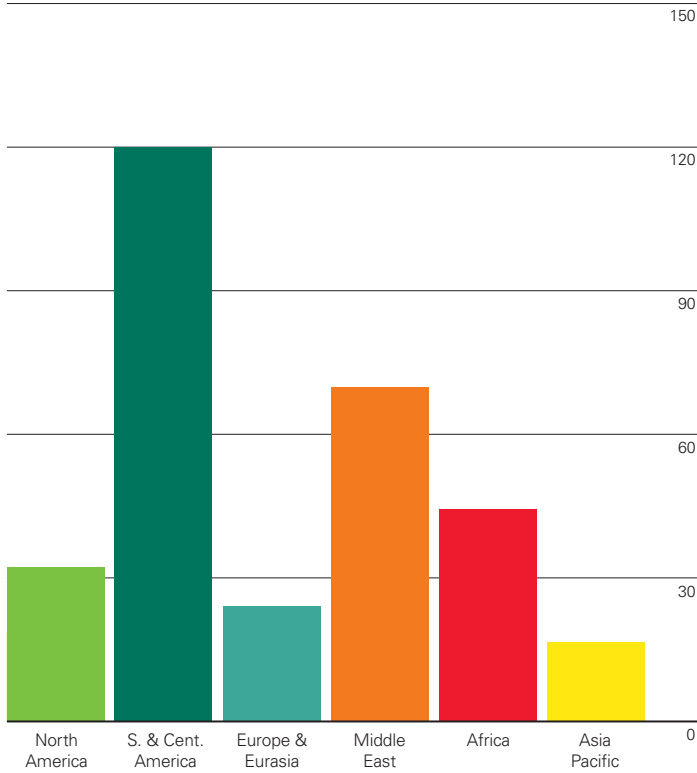
Reserves include gas condensate and natural gas liquids (NGLs) as well as crude oil.

Shares of total and R/P ratios are calculated using thousand million barrels figures.

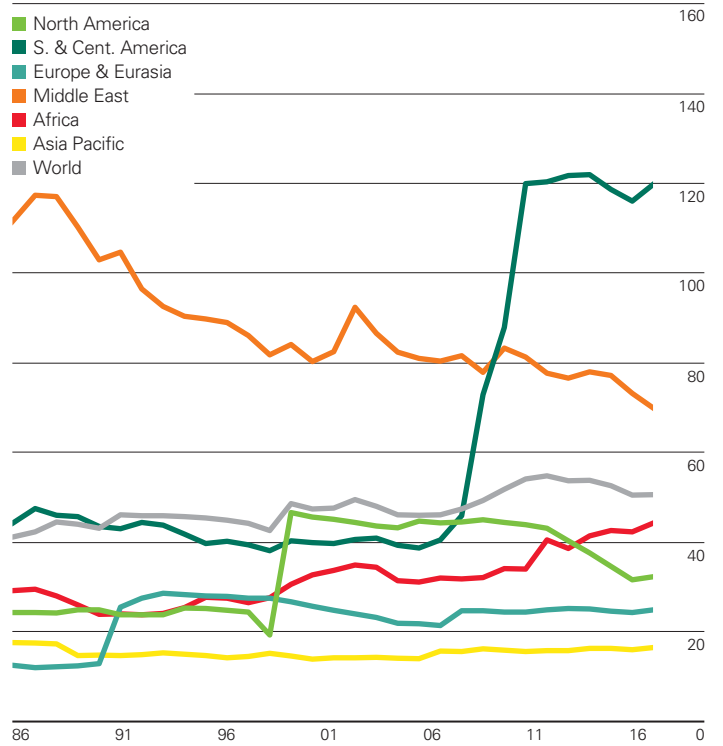
Reserves-to-production (R/P) ratios

Years

2016 by region



History

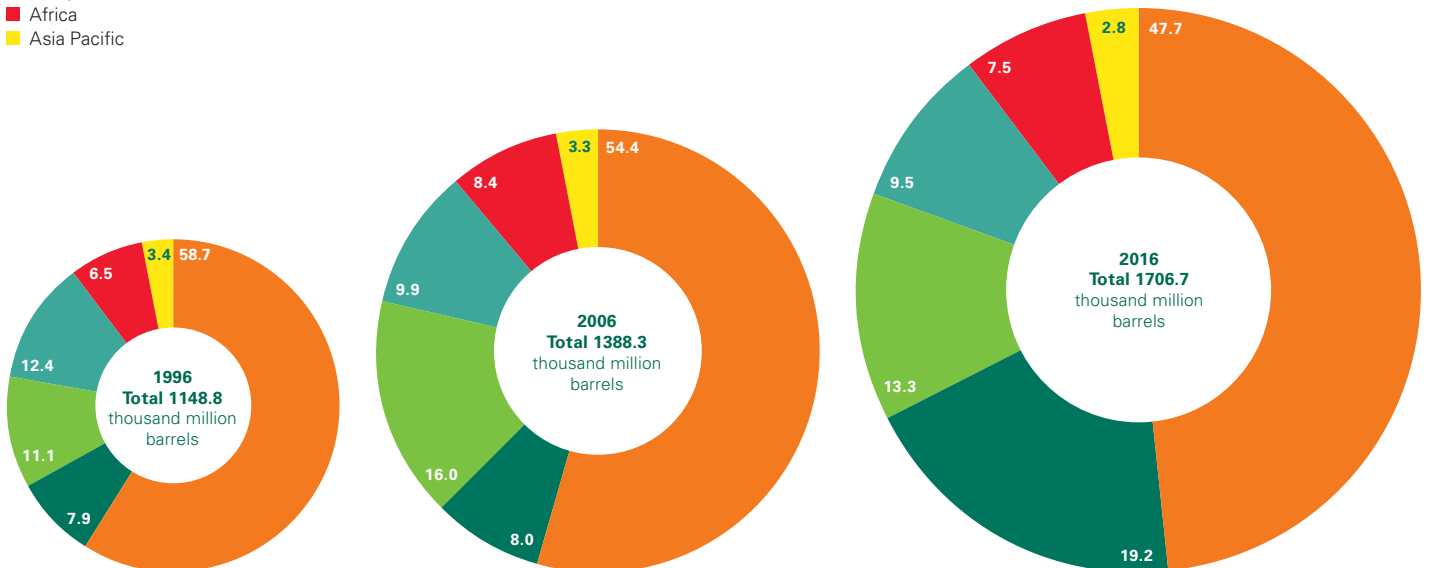


Global proved oil reserves in 2016 rose by 15 billion barrels (0.9%) to 1707 billion barrels, which would be sufficient to meet 50.6 years of global production at 2016 levels. The increase came largely from Iraq (10 billion barrels) and Russia (7 billion barrels), with small declines (<1 billion barrels) spread across a number of countries and regions. OPEC countries currently hold 71.5% of global proved reserves. N.B. lags in reporting official data mean that 2016 figures for many countries are not yet available.

Distribution of proved reserves in 1996, 2006 and 2016

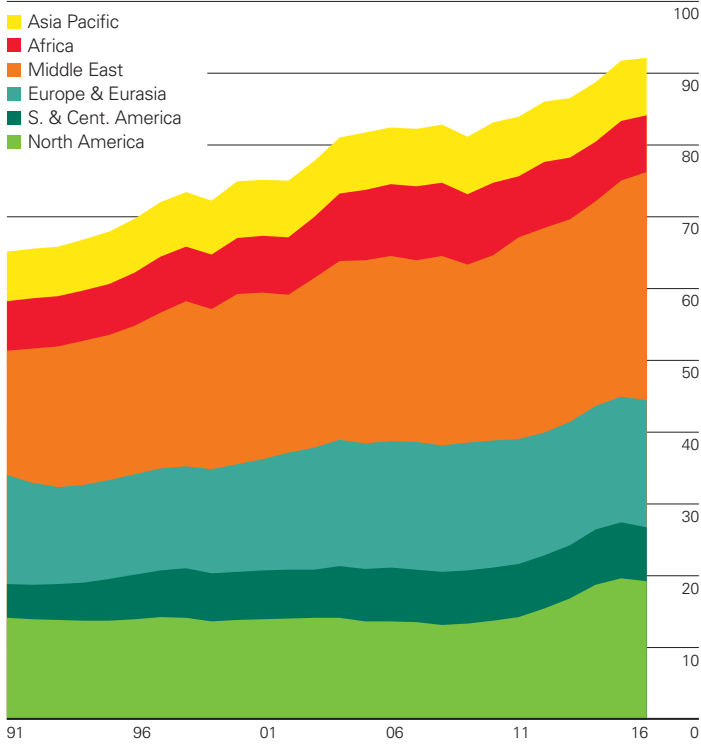
Percentage

- Middle East
- S. & Cent. America
- North America
- Europe & Eurasia
- Africa
- Asia Pacific



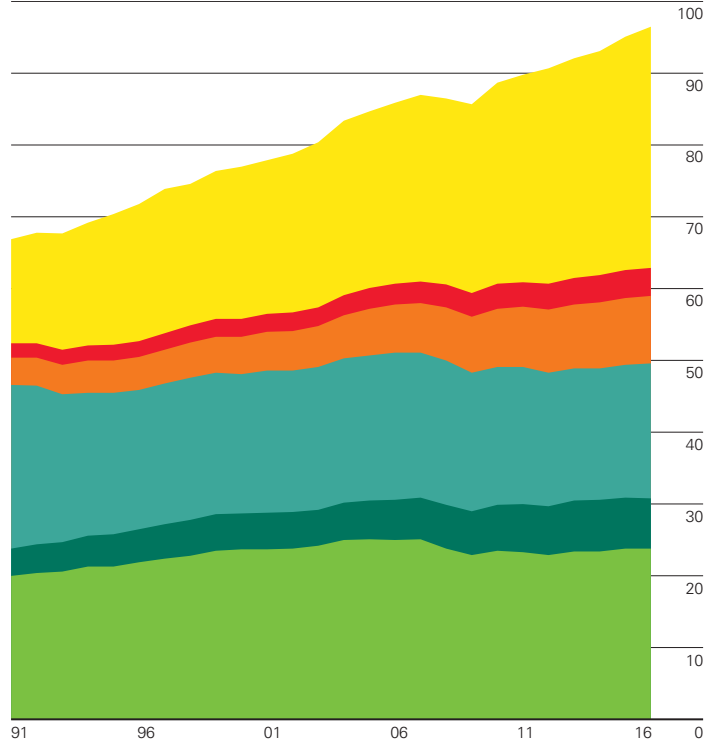
Oil: Production by region

Million barrels daily



Oil: Consumption by region

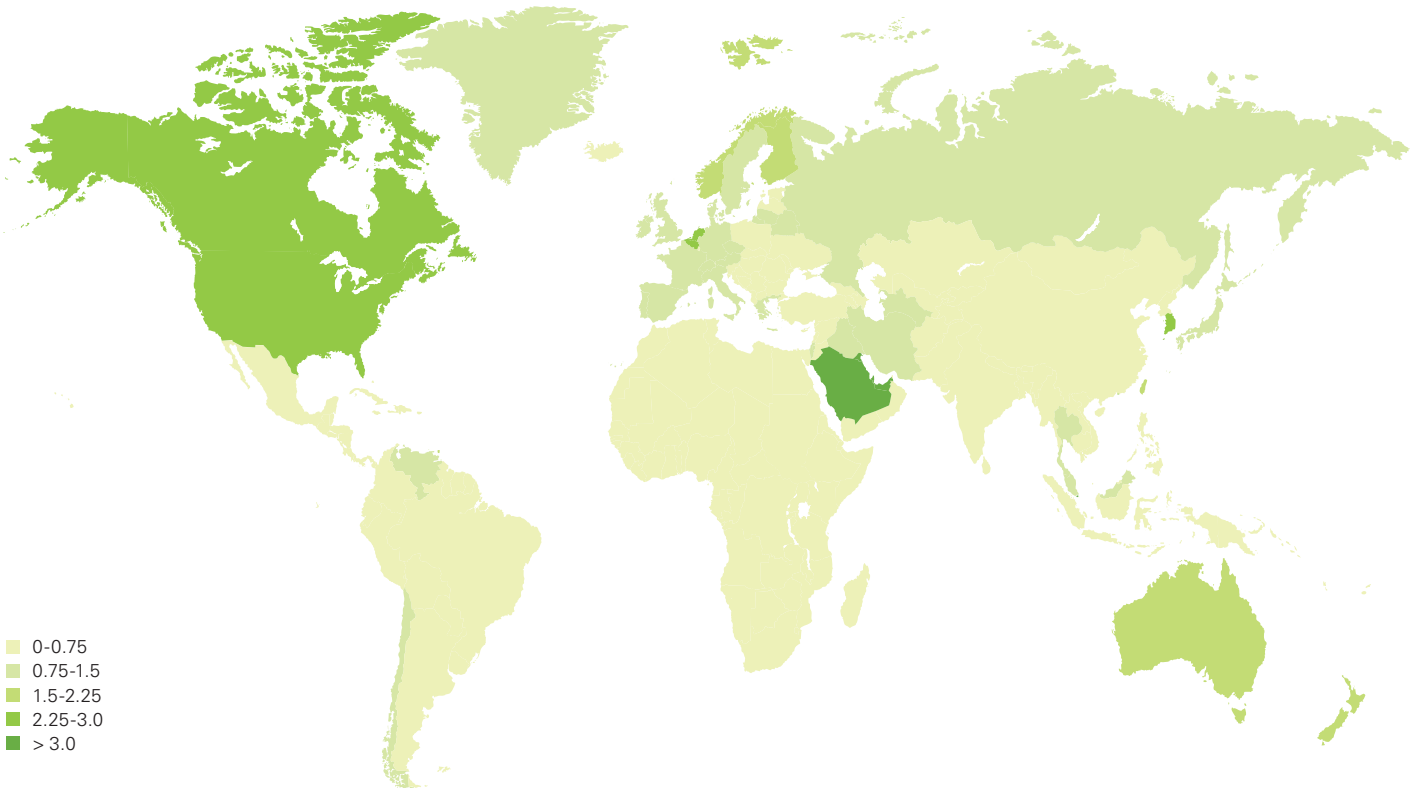
Million barrels daily



World oil production grew by only 0.4 million b/d in 2016, the slowest growth since 2013. Production in the Middle East rose by 1.7 million b/d, driven by Iran, Iraq and Saudi Arabia, but this was largely offset by declines in North America, Africa, Asia Pacific and South & Central America. Global oil consumption growth averaged 1.6 million b/d, above the 10-year average of 1 million b/d for the second successive year as a result of stronger than usual growth in the OECD. However, China (400,000 b/d) and India (330,000 b/d) still provided the largest contributions to growth.

Oil: Consumption per capita 2016

Tonnes



Spot crude prices

US dollars per barrel	Dubai \$/bbl*	Brent \$/bbl†	Nigerian Forcados \$/bbl	West Texas Intermediate \$/bbl‡
1981	34.32	35.93	36.18	36.08
1982	31.80	32.97	33.29	33.65
1983	28.78	29.55	29.54	30.30
1984	28.06	28.78	28.14	29.39
1985	27.53	27.56	27.75	27.98
1986	13.10	14.43	14.46	15.10
1987	16.95	18.44	18.39	19.18
1988	13.27	14.92	15.00	15.97
1989	15.62	18.23	18.30	19.68
1990	20.45	23.73	23.85	24.50
1991	16.63	20.00	20.11	21.54
1992	17.17	19.32	19.61	20.57
1993	14.93	16.97	17.41	18.45
1994	14.74	15.82	16.25	17.21
1995	16.10	17.02	17.26	18.42
1996	18.52	20.67	21.16	22.16
1997	18.23	19.09	19.33	20.61
1998	12.21	12.72	12.62	14.39
1999	17.25	17.97	18.00	19.31
2000	26.20	28.50	28.42	30.37
2001	22.81	24.44	24.23	25.93
2002	23.74	25.02	25.04	26.16
2003	26.78	28.83	28.66	31.07
2004	33.64	38.27	38.13	41.49
2005	49.35	54.52	55.69	56.59
2006	61.50	65.14	67.07	66.02
2007	68.19	72.39	74.48	72.20
2008	94.34	97.26	101.43	100.06
2009	61.39	61.67	63.35	61.92
2010	78.06	79.50	81.05	79.45
2011	106.18	111.26	113.65	95.04
2012	109.08	111.67	114.21	94.13
2013	105.47	108.66	111.95	97.99
2014	97.07	98.95	101.35	93.28
2015	51.20	52.39	54.41	48.71
2016	41.19	43.73	44.54	43.34

*1981-1985 Arabian Light, 1986-2016 Dubai dated.

†1981-1983 Forties, 1984-2016 Brent dated.

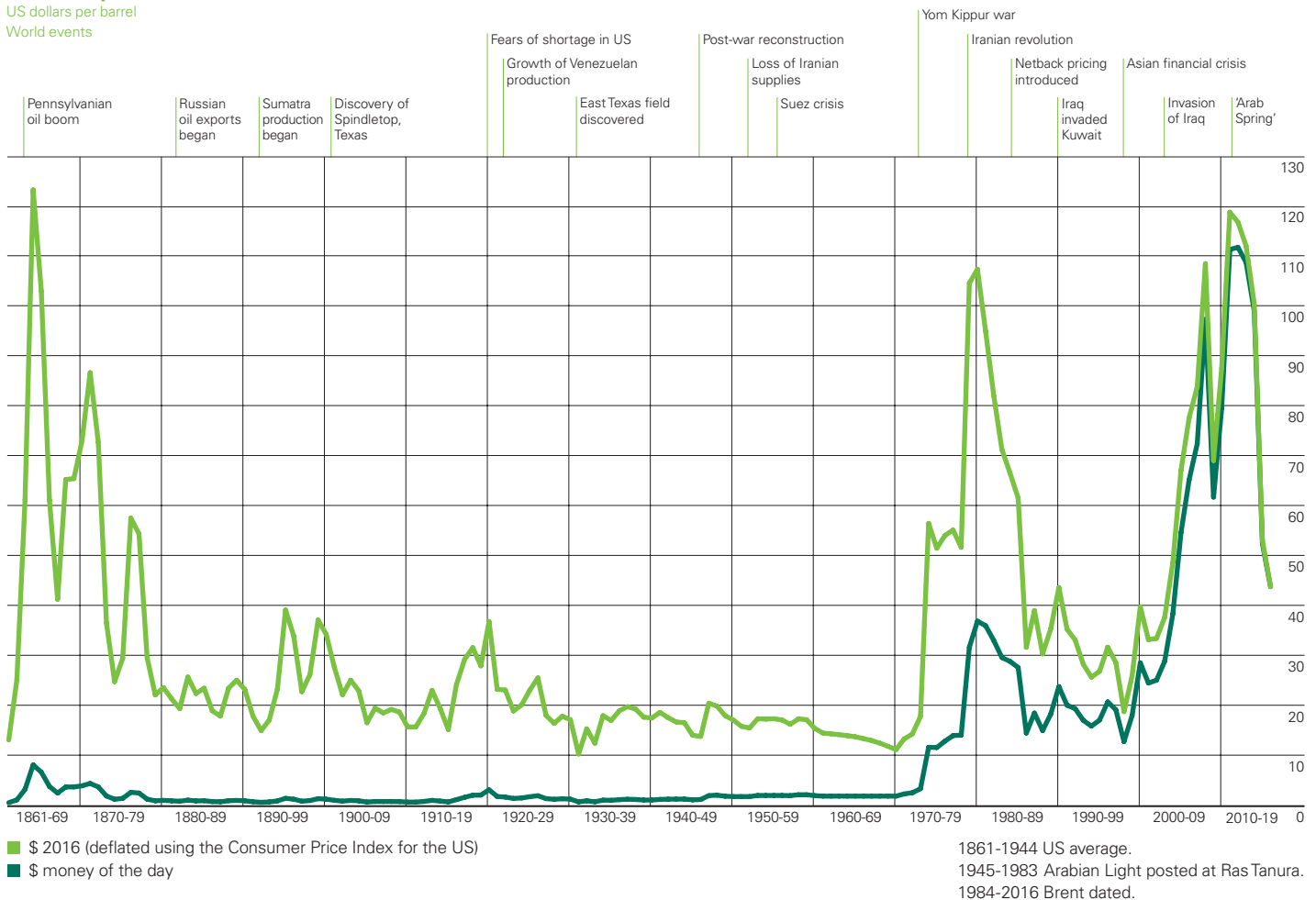
‡1981-1983 Posted WTI prices, 1984-2016 Spot WTI (Cushing) prices.

Source: Platts.

Crude oil prices 1861-2016

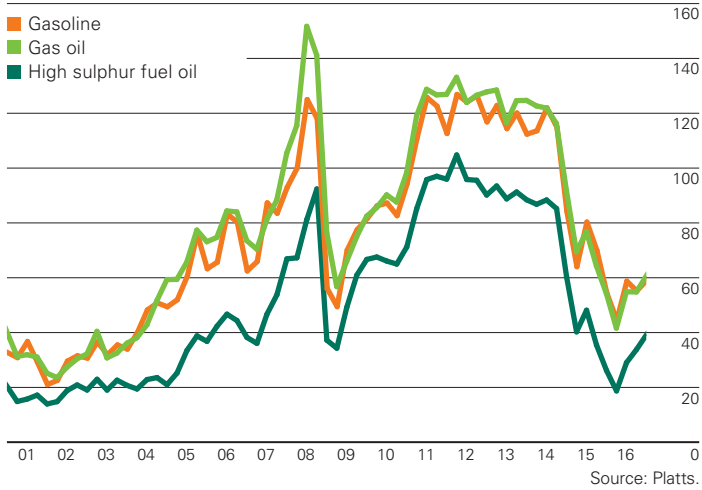
US dollars per barrel

World events



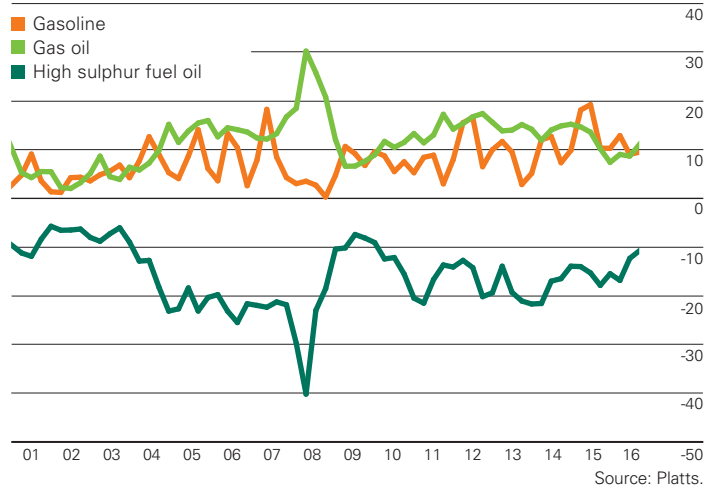
Oil product prices (Rotterdam)

US dollars per barrel



Product differentials to crude (Rotterdam products minus Dated Brent)

US dollars per barrel



Regional refining margins

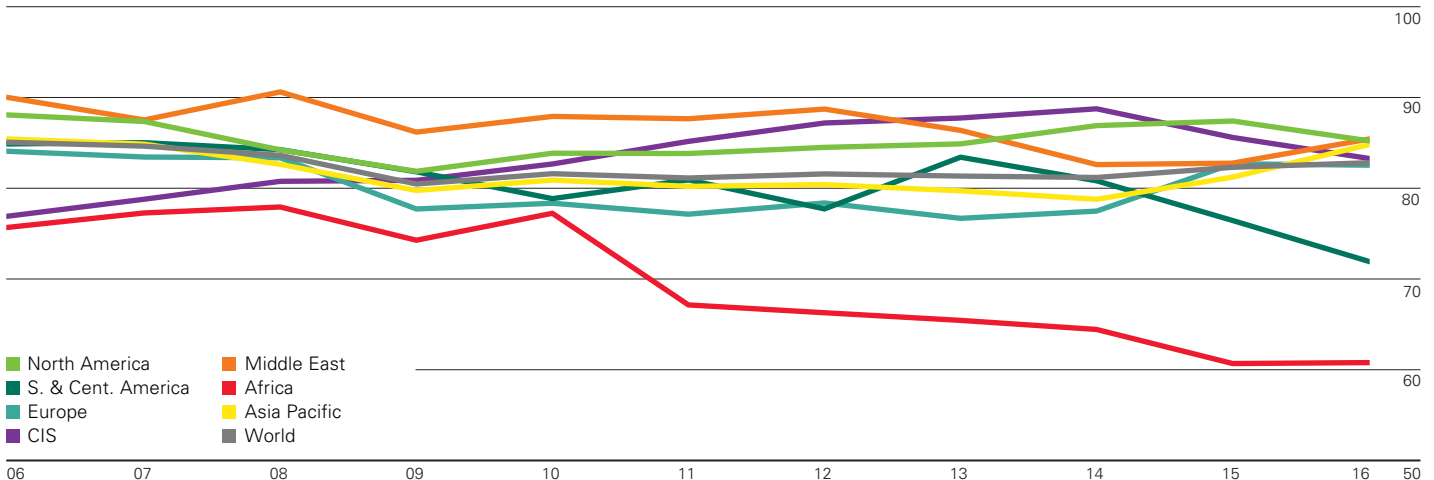
US dollars per barrel



Note: The refining margins presented are benchmark margins for three major global refining centres: US Gulf Coast (USGC), North West Europe (NWE – Rotterdam) and Singapore. In each case they are based on a single crude oil appropriate for that region and have optimized product yields based on a generic refinery configuration (cracking, hydrocracking or coking), again appropriate for that region. The margins are on a semi-variable basis, i.e. the margin after all variable costs and fixed energy costs.

Refinery utilization

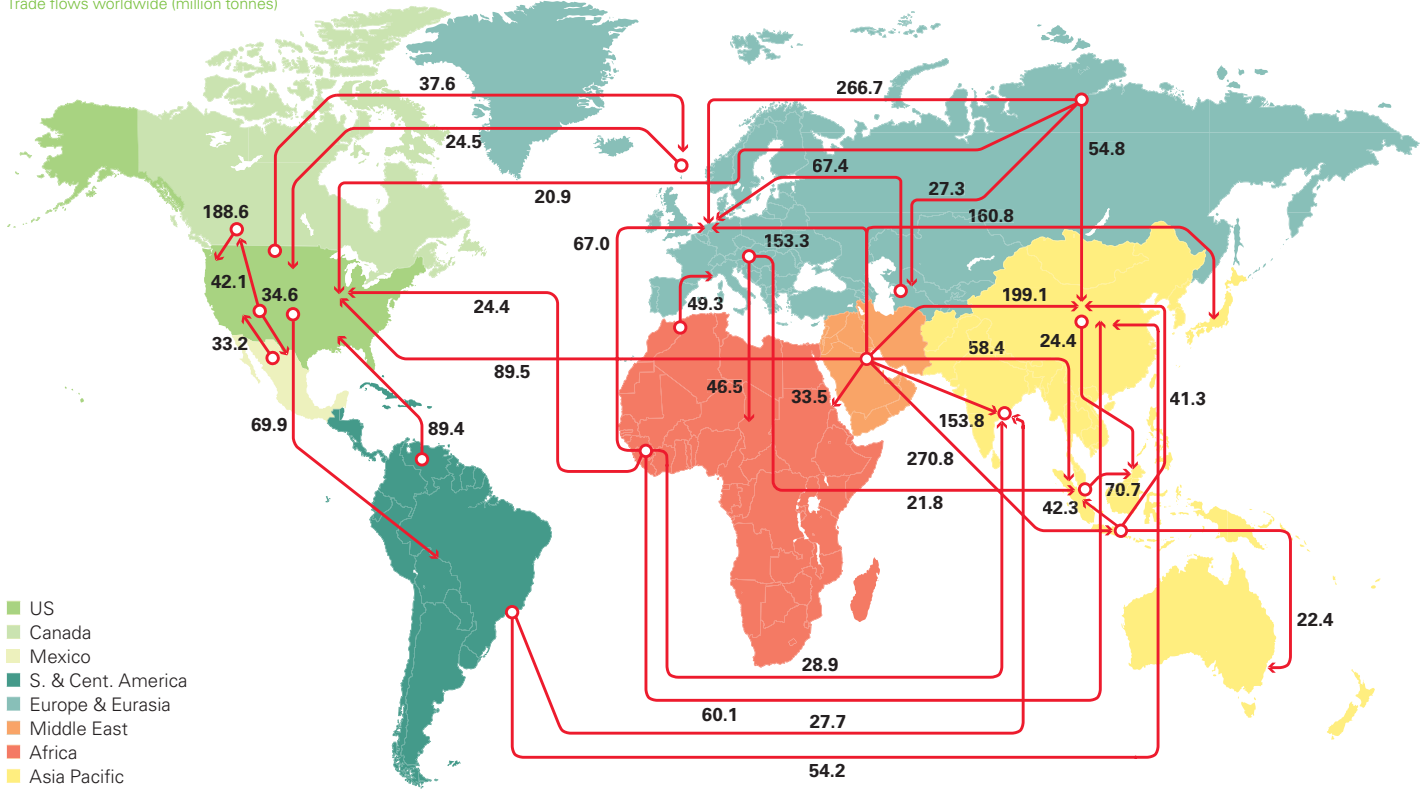
Percentage (based on average annual capacity)



Refinery throughput growth slowed to 0.6 million b/d in 2016, with crude runs falling in Mexico (-130,000 b/d), South & Central America (-210,000 b/d) and Europe & Eurasia (-300,000 b/d). Global refinery capacity increased by only 0.4 million b/d, well below 10-year average growth (1 million b/d) for the second year in a row as Chinese capacity declined. Global refinery utilisation rose from 82.4% in 2015 to 82.9% in 2016. Utilisation in South & Central America fell to 72% – the lowest since 1987.

Major trade movements 2016

Trade flows worldwide (million tonnes)



Oil trade in 2015 and 2016

Million tonnes	2015				2016			
	Crude imports	Product imports	Crude exports	Product exports	Crude imports	Product imports	Crude exports	Product exports
US	366.7	99.8	25.3	191.9	393.3	104.5	24.4	203.1
Canada	32.3	29.4	159.3	30.7	29.2	31.6	164.4	29.4
Mexico	†	35.2	57.6	8.1	†	38.2	60.8	8.8
S. & Cent. America	27.0	88.9	173.4	30.4	24.6	90.5	177.4	29.6
Europe	499.6	187.6	11.8	131.7	499.4	200.8	17.6	132.2
Russia	2.9	2.0	261.9	152.9	0.8	1.7	274.0	151.0
Other CIS	23.1	12.8	88.5	11.8	18.3	12.2	81.7	8.7
Iraq	–	1.7	161.2	0.8	†	1.2	177.5	1.5
Kuwait	0.1	0.7	96.6	26.4	†	0.8	103.3	25.0
Saudi Arabia	†	7.3	359.2	38.4	†	7.3	375.3	48.4
United Arab Emirates	0.4	16.4	125.4	54.2	1.2	24.4	123.2	60.8
Other Middle East	26.2	19.3	157.5	42.4	23.9	21.4	203.2	48.6
North Africa	8.4	35.2	60.6	23.9	4.4	34.4	58.2	24.8
West Africa	0.8	31.3	236.7	7.3	0.7	32.9	216.5	7.3
East & S. Africa	20.0	31.3	8.8	2.7	21.2	25.1	6.9	2.3
Australasia	24.8	24.4	10.5	3.9	20.4	27.6	9.4	3.9
China	336.2	75.7	1.8	36.2	382.6	74.5	2.9	46.0
India	193.3	22.8	0.2	56.6	212.3	30.0	†	61.9
Japan	168.9	44.9	0.3	14.7	168.0	39.1	†	14.7
Singapore	45.9	125.8	0.1	87.7	48.1	121.4	0.1	93.7
Other Asia Pacific	259.1	164.2	39.1	104.0	269.5	185.8	41.0	103.5
Total World	2035.9	1056.7	2035.9	1056.7	2117.8	1105.2	2117.8	1105.2
Thousand barrels daily								
US	7365	2086	509	4012	7877	2179	489	4234
Canada	649	614	3200	641	586	659	3293	613
Mexico	†	735	1157	169	†	796	1217	184
S. & Cent. America	542	1858	3482	636	493	1887	3554	617
Europe	10039	3921	237	2753	10001	4187	353	2756
Russia	58	42	5259	3195	15	35	5487	3147
Other CIS	464	268	1777	247	366	254	1636	180
Iraq	–	35	3238	17	†	24	3554	30
Kuwait	2	15	1939	551	†	17	2069	521
Saudi Arabia	†	153	7214	803	†	152	7517	1009
United Arab Emirates	8	343	2518	1133	23	509	2468	1268
Other Middle East	526	404	3163	887	480	446	4069	1013
North Africa	168	737	1218	499	88	717	1165	518
West Africa	17	655	4753	153	14	686	4335	151
East & S. Africa	401	653	177	56	425	524	138	49
Australasia	497	509	211	81	408	575	189	81
China	6751	1582	36	757	7663	1553	58	959
India	3881	476	3	1184	4252	625	†	1291
Japan	3392	939	6	306	3364	815	†	307
Singapore	921	2630	2	1834	963	2531	2	1954
Other Asia Pacific	5204	3433	786	2174	5397	3872	822	2159
Total World	40885	22089	40885	22089	42413	23041	42413	23041

†Less than 0.05.

‡Less than 0.5.

Notes: Bunkers are not included as exports. Intra-area movements (for example, between countries in Europe) are excluded. Crude imports and exports include condensates.

Total proved reserves

	At end 1996 Trillion cubic metres	At end 2006 Trillion cubic metres	At end 2015 Trillion cubic metres	At end 2016			
				Trillion cubic metres	Trillion cubic feet	Share of total	R/P ratio
US	4.7	6.0	8.7	8.7	307.7	4.7%	11.6
Canada	1.9	1.6	2.2	2.2	76.7	1.2%	14.3
Mexico	1.8	0.4	0.2	0.2	8.6	0.1%	5.2
Total North America	8.5	8.0	11.1	11.1	393.0	6.0%	11.7
Argentina	0.6	0.4	0.4	0.4	12.4	0.2%	9.2
Bolivia	0.1	0.7	0.3	0.3	9.9	0.2%	14.2
Brazil	0.2	0.3	0.4	0.4	13.1	0.2%	15.8
Colombia	0.2	0.1	0.1	0.1	4.4	0.1%	11.9
Peru	0.2	0.3	0.4	0.4	14.1	0.2%	28.5
Trinidad & Tobago	0.5	0.5	0.3	0.3	10.6	0.2%	8.7
Venezuela	4.1	4.7	5.7	5.7	201.3	3.1%	166.3
Other S. & Cent. America	0.1	0.1	0.1	0.1	2.2	♦	26.7
Total S. & Cent. America	6.0	7.2	7.7	7.6	268.0	4.1%	42.9
Azerbaijan	n/a	0.9	1.1	1.1	40.6	0.6%	65.8
Denmark	0.1	0.1	†	†	0.5	♦	2.9
Germany	0.2	0.1	†	†	1.2	♦	5.3
Italy	0.3	0.1	†	†	1.2	♦	6.6
Kazakhstan	n/a	1.3	1.0	1.0	34.0	0.5%	48.3
Netherlands	1.6	1.2	0.7	0.7	24.6	0.4%	17.4
Norway	1.5	2.3	1.9	1.8	62.3	0.9%	15.1
Poland	0.1	0.1	0.1	0.1	3.2	♦	23.0
Romania	0.4	0.6	0.1	0.1	3.9	0.1%	12.0
Russian Federation	30.9	31.2	32.3	32.3	1139.6	17.3%	55.7
Turkmenistan	n/a	2.3	17.5	17.5	617.3	9.4%	261.7
Ukraine	n/a	0.7	0.6	0.6	20.9	0.3%	33.2
United Kingdom	0.8	0.4	0.2	0.2	7.3	0.1%	5.0
Uzbekistan	n/a	1.2	1.1	1.1	38.3	0.6%	17.3
Other Europe & Eurasia	0.2	0.2	0.2	0.2	7.2	0.1%	23.2
Total Europe & Eurasia	39.8	42.8	56.8	56.7	2002.0	30.4%	56.3
Bahrain	0.1	0.1	0.2	0.2	5.8	0.1%	10.5
Iran	23.0	26.9	33.5	33.5	1183.0	18.0%	165.5
Iraq	3.4	3.2	3.7	3.7	130.5	2.0%	*
Israel	†	†	0.2	0.2	5.5	0.1%	16.8
Kuwait	1.5	1.8	1.8	1.8	63.0	1.0%	104.2
Oman	0.6	1.0	0.7	0.7	24.9	0.4%	19.9
Qatar	8.5	25.5	24.3	24.3	858.1	13.0%	134.1
Saudi Arabia	5.7	7.1	8.4	8.4	297.6	4.5%	77.0
Syria	0.2	0.3	0.3	0.3	10.1	0.2%	79.1
United Arab Emirates	5.8	6.4	6.1	6.1	215.1	3.3%	98.5
Yemen	0.3	0.3	0.3	0.3	9.4	0.1%	365.8
Other Middle East	†	†	†	†	0.2	♦	52.6
Total Middle East	49.2	72.6	79.4	79.4	2803.2	42.5%	124.5
Algeria	3.7	4.5	4.5	4.5	159.1	2.4%	49.3
Egypt	0.8	2.0	1.8	1.8	65.2	1.0%	44.1
Libya	1.3	1.4	1.5	1.5	53.1	0.8%	149.2
Nigeria	3.5	5.2	5.3	5.3	186.6	2.8%	117.7
Other Africa	0.8	1.2	1.1	1.1	39.3	0.6%	54.9
Total Africa	10.2	14.4	14.2	14.3	503.3	7.6%	68.4
Australia	1.3	2.3	3.5	3.5	122.6	1.9%	38.1
Bangladesh	0.3	0.4	0.2	0.2	7.3	0.1%	7.5
Brunei	0.4	0.3	0.3	0.3	9.7	0.1%	24.6
China	1.2	1.7	4.8	5.4	189.5	2.9%	38.8
India	0.6	1.1	1.3	1.2	43.3	0.7%	44.4
Indonesia	2.0	2.6	2.8	2.9	101.2	1.5%	41.1
Malaysia	2.4	2.5	1.2	1.2	41.3	0.6%	15.8
Myanmar	0.3	0.5	0.5	1.2	42.0	0.6%	63.0
Pakistan	0.6	0.8	0.5	0.5	16.0	0.2%	10.9
Papua New Guinea	†	†	0.1	0.2	7.4	0.1%	20.1
Thailand	0.2	0.3	0.2	0.2	7.3	0.1%	5.4
Vietnam	0.2	0.2	0.6	0.6	21.8	0.3%	57.6
Other Asia Pacific	0.4	0.4	0.3	0.3	9.8	0.1%	13.7
Total Asia Pacific	9.9	13.2	16.2	17.5	619.3	9.4%	30.2
Total World	123.5	158.2	185.4	186.6	6588.8	100.0%	52.5
of which: OECD	14.7	14.9	17.9	17.8	629.1	9.5%	13.9
Non-OECD	108.9	143.3	167.5	168.8	5959.7	90.5%	74.3
European Union	3.6	2.8	1.3	1.3	45.3	0.7%	10.8
CIS	30.9	37.6	53.6	53.6	1891.8	28.7%	70.1

*More than 500 years.

†Less than 0.05.

♦Less than 0.05%.

n/a not available.

Notes: Total proved reserves of natural gas – Generally taken to be those quantities that geological and engineering information indicates with reasonable certainty can be recovered in the future from known reservoirs under existing economic and operating conditions. The data series for total proved natural gas reserves does not necessarily meet the definitions, guidelines and practices used for determining proved reserves at a company level, for instance as published by the US Securities and Exchange Commission, nor does it necessarily represent BP's view of proved reserves by country.

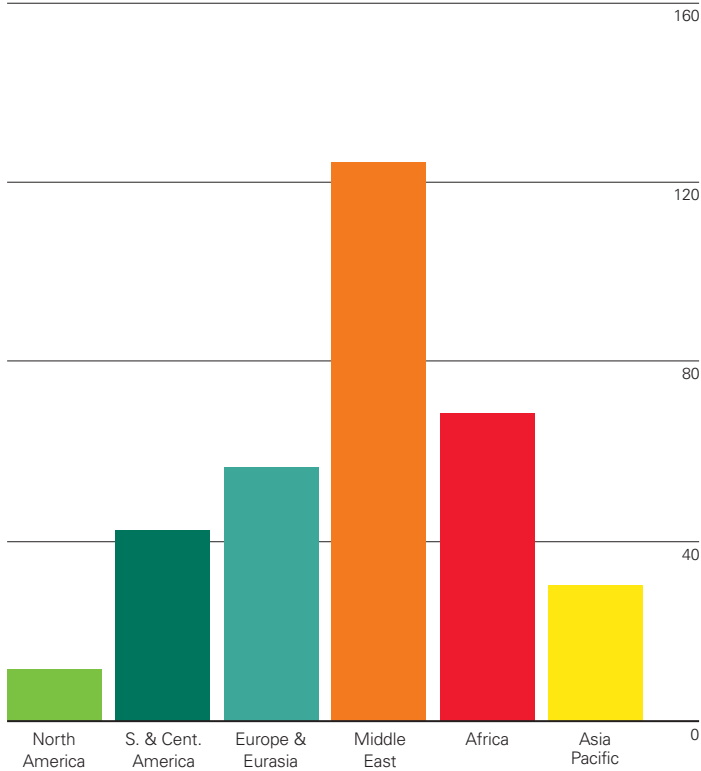
Reserves-to-production (R/P) ratio – If the reserves remaining at the end of any year are divided by the production in that year, the result is the length of time that those remaining reserves would last if production were to continue at that rate.

Source of data – The estimates in this table have been compiled using a combination of primary official sources and third-party data from Cedigaz and the OPEC Secretariat.

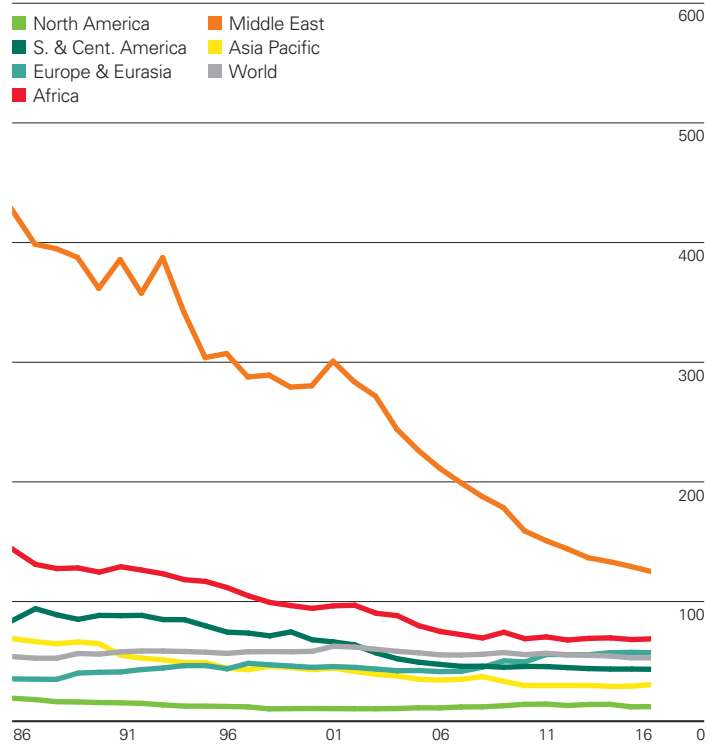
Reserves-to-production (R/P) ratios

Years

2016 by region



History

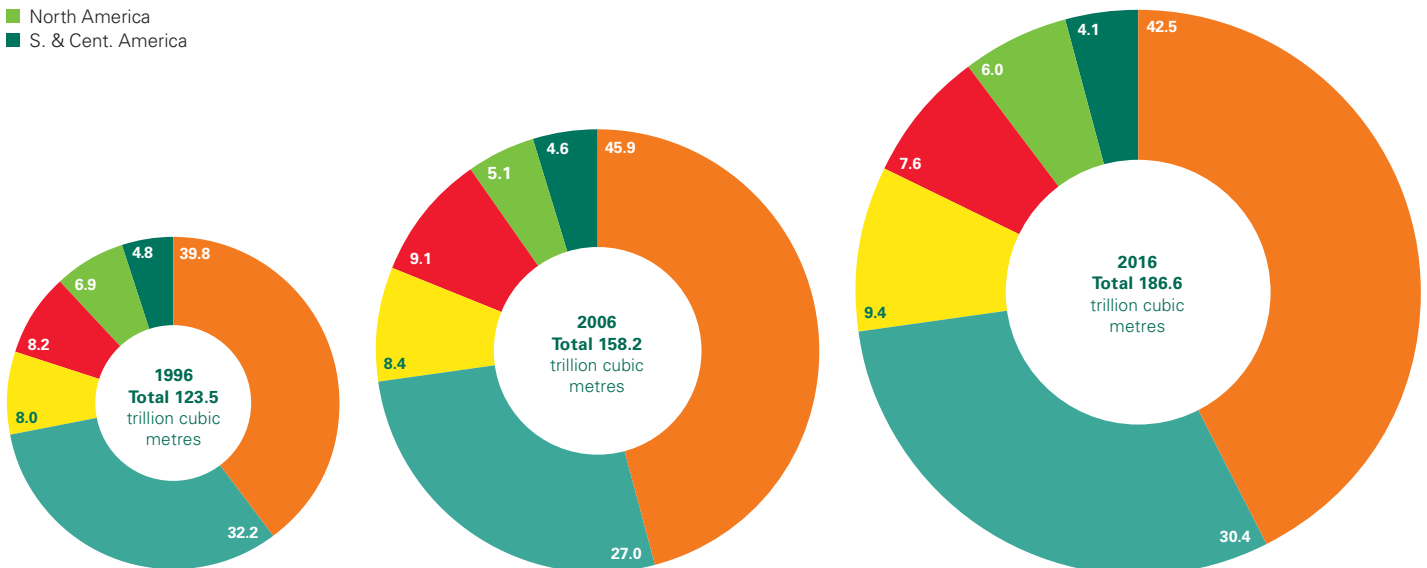


Global proved gas reserves in 2016 rose slightly by 1.2 trillion cubic metres (tcm) or 0.6% to 186.6 tcm. As with oil, this is sufficient to meet more than 50 years of current production (52.5 years). Myanmar (+0.7 tcm) and China (+0.6 tcm) were the main contributors to growth. By region, the Middle East holds the largest proved reserves (79.4 tcm, 42.5% of the global total), while by country, Iran is the largest reserve holder (33.5 tcm, 18% of total). N.B. Lags in reporting official data mean that 2016 figures for many countries are not yet available.

Distribution of proved reserves in 1996, 2006 and 2016

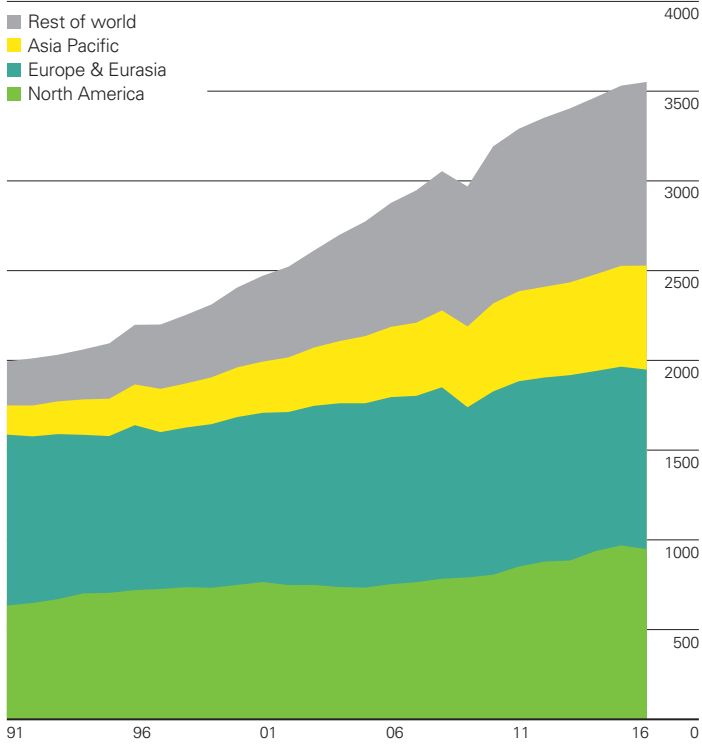
Percentage

- Middle East
- Europe & Eurasia
- Asia Pacific
- Africa
- North America
- S. & Cent. America



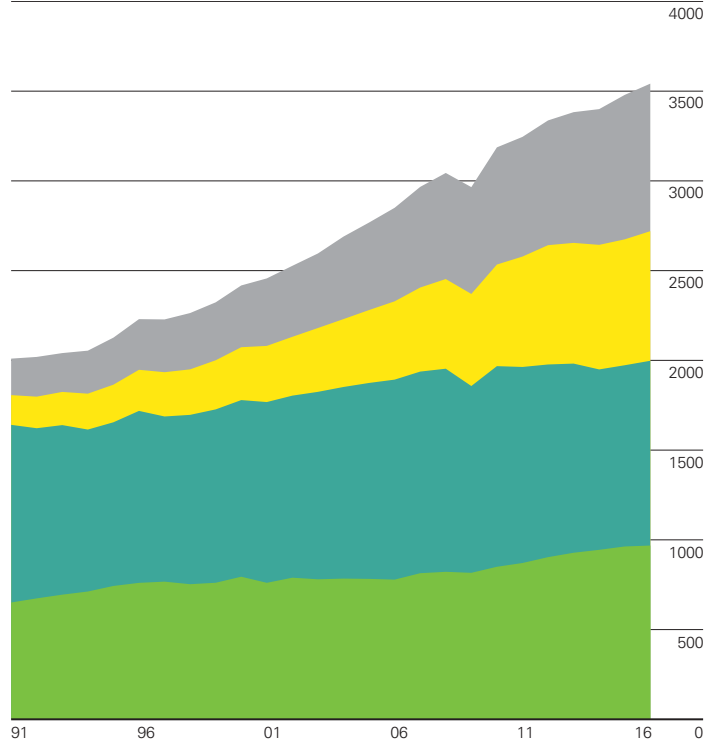
Natural gas: Production by region

Billion cubic metres



Natural gas: Consumption by region

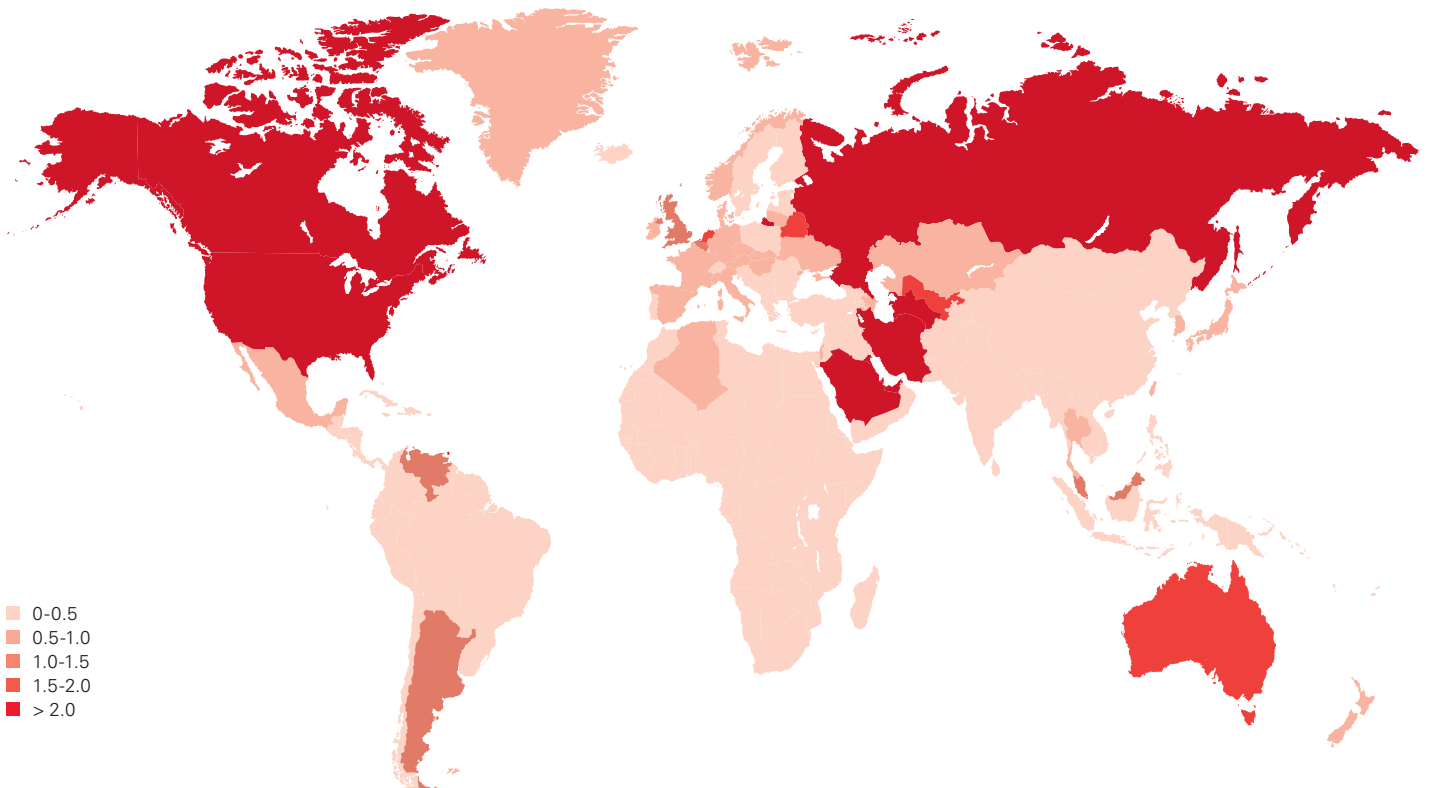
Billion cubic metres



Global natural gas production increased by only 0.3%, or 21 billion cubic metres (bcm) to 3552 bcm. Declining production in North America (-21 bcm) partially offset strong growth from Australia (19 bcm) and Iran (13 bcm). Gas consumption increased by 63 bcm or 1.5% – slower than the 10 year average (2.3%). EU gas consumption rose sharply by 30 bcm, or 7.1% – the fastest growth since 2010. Russia saw the largest drop in consumption of any country (-12 bcm).

Natural gas: Consumption per capita 2016

Tonnes oil equivalent



Prices

US dollars per million Btu	LNG Japan cif	Natural gas				Crude oil OECD countries cif
		Average German Import Price*	UK (Heren NBP Index)†	US Henry Hub‡	Canada (Alberta)‡	
1986	4.10	3.93	–	–	–	2.57
1987	3.35	2.55	–	–	–	3.09
1988	3.34	2.22	–	–	–	2.56
1989	3.28	2.00	–	1.70	–	3.01
1990	3.64	2.78	–	1.64	1.05	3.82
1991	3.99	3.23	–	1.49	0.89	3.33
1992	3.62	2.70	–	1.77	0.98	3.19
1993	3.52	2.51	–	2.12	1.69	2.82
1994	3.18	2.35	–	1.92	1.45	2.70
1995	3.46	2.43	–	1.69	0.89	2.96
1996	3.66	2.50	1.87	2.76	1.12	3.54
1997	3.91	2.66	1.96	2.53	1.36	3.29
1998	3.05	2.33	1.86	2.08	1.42	2.16
1999	3.14	1.86	1.58	2.27	2.00	2.98
2000	4.72	2.91	2.71	4.23	3.75	4.83
2001	4.64	3.67	3.17	4.07	3.61	4.08
2002	4.27	3.21	2.37	3.33	2.57	4.17
2003	4.77	4.06	3.33	5.63	4.83	4.89
2004	5.18	4.30	4.46	5.85	5.03	6.27
2005	6.05	5.83	7.38	8.79	7.25	8.74
2006	7.14	7.87	7.87	6.76	5.83	10.66
2007	7.73	7.99	6.01	6.95	6.17	11.95
2008	12.55	11.60	10.79	8.85	7.99	16.76
2009	9.06	8.53	4.85	3.89	3.38	10.41
2010	10.91	8.03	6.56	4.39	3.69	13.47
2011	14.73	10.49	9.04	4.01	3.47	18.56
2012	16.75	10.93	9.46	2.76	2.27	18.82
2013	16.17	10.73	10.64	3.71	2.93	18.25
2014	16.33	9.11	8.25	4.35	3.87	16.80
2015	10.31	6.72	6.53	2.60	2.01	8.77
2016	6.94	4.93	4.69	2.46	1.55	7.04

*Source: 1986-1990 German Federal Statistical Office, 1991-2016 German Federal Office of Economics and Export Control (BAFA).

†Source: ICIS Heren Energy Ltd.

‡Source: Energy Intelligence Group, *Natural Gas Week*.

Note: cif = cost+insurance+freight (average prices).

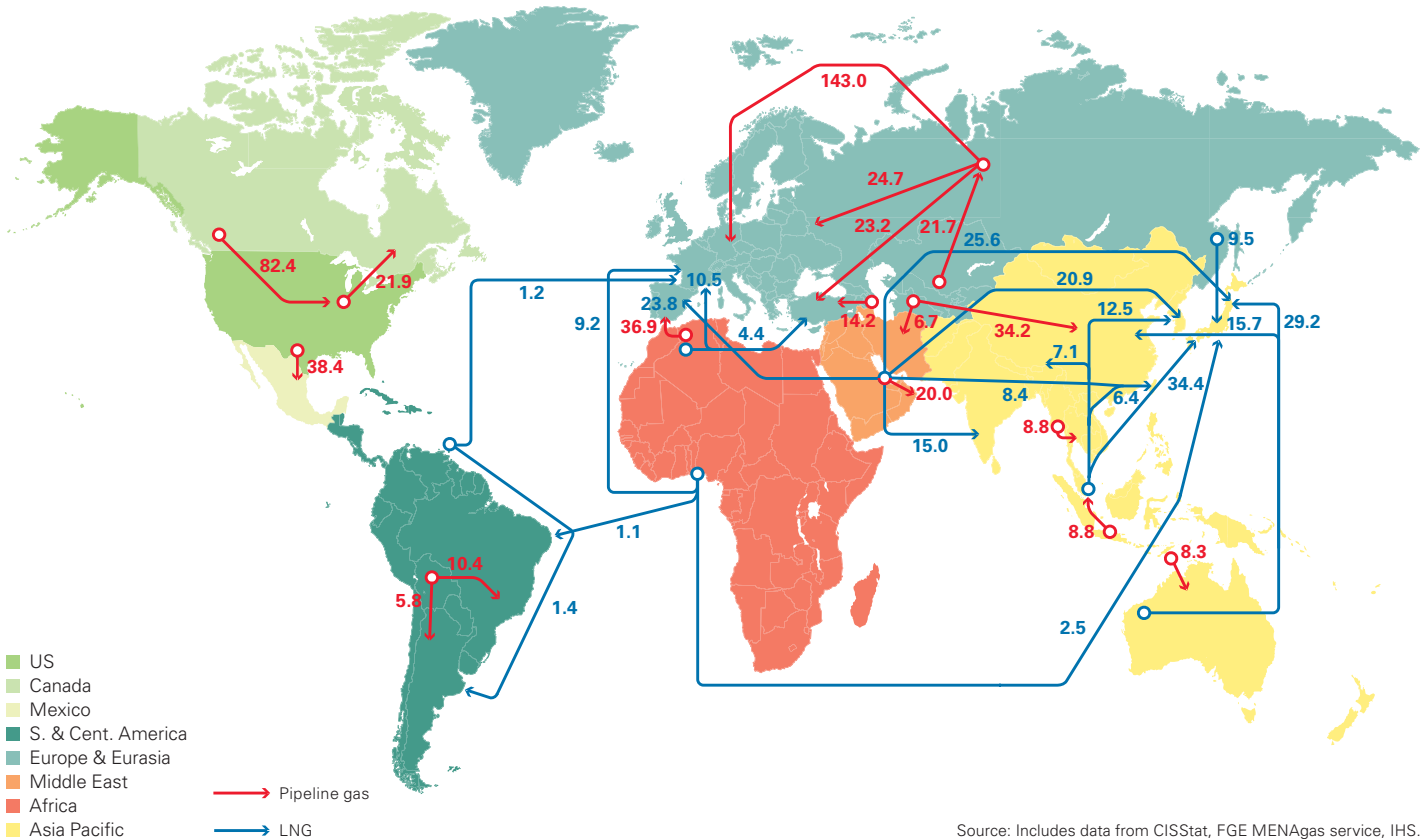
Prices

\$/mmBtu



Major trade movements 2016

Trade flows worldwide (billion cubic metres)



Gas trade in 2015 and 2016 in billion cubic metres

Billion cubic metres	2015				2016			
	Pipeline imports	LNG imports	Pipeline exports	LNG exports	Pipeline imports	LNG imports	Pipeline exports	LNG exports
US	74.4	2.6	49.1	0.7	82.5	2.5	60.3	4.4
Canada	19.2	0.6	74.3	†	21.9	0.3	82.4	†
Mexico	29.9	7.3	†	–	38.4	5.9	†	–
Trinidad and Tobago	–	–	–	16.9	–	–	–	14.3
Other S. & Cent. America	19.9	19.8	19.9	5.1	16.8	15.5	16.8	6.1
France	31.8	6.8	–	0.6	32.3	9.7	–	1.5
Germany	102.3	–	32.7	–	99.3	–	19.3	–
Italy	55.7	5.4	0.2	–	59.4	5.7	–	–
Netherlands	33.6	2.1	47.1	1.3	38.0	1.5	52.3	0.7
Norway	†	–	109.6	5.9	†	–	109.8	6.3
Spain	15.2	13.1	0.5	1.8	15.0	13.2	0.6	0.2
Turkey	38.4	7.7	0.6	–	37.4	7.7	0.6	–
United Kingdom	29.0	13.1	13.4	0.3	34.1	10.5	10.0	0.5
Other Europe	94.7	6.9	13.8	1.5	100.2	8.2	15.0	1.3
Russian Federation	21.8	–	179.1	14.0	21.7	–	190.8	14.0
Ukraine	17.3	–	–	–	11.1	–	–	–
Other CIS	27.0	–	72.3	–	27.9	–	74.0	–
Qatar	–	–	20.0	101.8	–	–	20.0	104.4
Other Middle East	29.6	10.2	8.4	18.8	26.9	14.2	8.4	18.1
Algeria	–	–	26.3	16.6	–	–	37.1	15.9
Other Africa	9.0	3.7	11.0	30.0	8.8	10.2	8.5	29.6
Australia	6.4	–	–	38.1	8.3	0.1	–	56.8
China	33.6	25.8	–	–	38.0	34.3	–	–
Japan	–	110.7	–	–	–	108.5	–	–
Indonesia	–	–	9.3	20.7	–	–	8.8	21.2
South Korea	–	43.8	–	0.2	–	43.9	–	0.1
Other Asia Pacific	20.3	46.0	21.4	51.4	19.3	54.8	22.7	51.1
Total World	709.0	325.5	709.0	325.5	737.5	346.6	737.5	346.6

†Less than 0.05.

Source: Includes data from CISStat, FGE MENAgas service, IHS.

Total proved reserves at end 2016

Million tonnes	Anthracite and bituminous	Sub-bituminous and lignite	Total	Share of total	R/P ratio
US	221400	30182	251582	22.1%	381
Canada	4346	2236	6582	0.6%	109
Mexico	1160	51	1211	0.1%	151
Total North America	226906	32469	259375	22.8%	356
Brazil	1547	5049	6596	0.6%	*
Colombia	4881	–	4881	0.4%	54
Venezuela	731	–	731	0.1%	*
Other S. & Cent. America	1784	24	1808	0.2%	*
Total S. & Cent. America	8943	5073	14016	1.2%	138
Bulgaria	192	2174	2366	0.2%	75
Czech Republic	1103	2573	3676	0.3%	80
Germany	12	36200	36212	3.2%	206
Greece	–	2876	2876	0.3%	87
Hungary	276	2633	2909	0.3%	311
Kazakhstan	25605	–	25605	2.2%	250
Poland	18700	5461	24161	2.1%	184
Romania	11	280	291	♦	13
Russian Federation	69634	90730	160364	14.1%	417
Serbia	402	7112	7514	0.7%	196
Spain	868	319	1187	0.1%	*
Turkey	378	10975	11353	1.0%	163
Ukraine	32039	2336	34375	3.0%	*
United Kingdom	70	–	70	♦	17
Uzbekistan	1375	–	1375	0.1%	355
Other Europe & Eurasia	2618	5172	7790	0.7%	201
Total Europe & Eurasia	153283	168841	322124	28.3%	284
South Africa	9893	–	9893	0.9%	39
Zimbabwe	502	–	502	♦	186
Other Africa	2756	66	2822	0.2%	276
Middle East	1203	–	1203	0.1%	*
Total Middle East & Africa	14354	66	14420	1.3%	54
Australia	68310	76508	144818	12.7%	294
China	230004	14006	244010	21.4%	72
India	89782	4987	94769	8.3%	137
Indonesia	17326	8247	25573	2.2%	59
Japan	340	10	350	♦	261
Mongolia	1170	1350	2520	0.2%	66
New Zealand	825	6750	7575	0.7%	*
Pakistan	207	2857	3064	0.3%	*
South Korea	326	–	326	♦	189
Thailand	–	1063	1063	0.1%	63
Vietnam	3116	244	3360	0.3%	85
Other Asia Pacific	1322	646	1968	0.2%	29
Total Asia Pacific	412728	116668	529396	46.5%	102
Total World	816214	323117	1139331	100.0%	153
of which: OECD	319878	177264	497142	43.6%	291
Non-OECD	496336	145853	642189	56.4%	112
European Union	21813	53006	74819	6.6%	162
CIS	130162	93066	223228	19.6%	417

*More than 500 years.

♦Less than 0.05%.

Source: Includes data from Federal Institute for Geosciences and Natural Resources (BGR) Energy Study 2016.

Notes: Total proved reserves of coal – Generally taken to be those quantities that geological and engineering information indicates with reasonable certainty can be recovered in the future from known reservoirs under existing economic and operating conditions. The data series for total proved coal reserves does not necessarily meet the definitions, guidelines and practices used for determining proved reserves at company level, for instance as published by the US Securities and Exchange Commission, nor does it necessarily represent BP's view of proved reserves by country.

Reserves-to-production (R/P) ratio – If the reserves remaining at the end of any year are divided by the production in that year, the result is the length of time that those remaining reserves would last if production were to continue at that rate.

Reserves-to-production (R/P) ratios are calculated excluding other solid fuels in reserves and production.

Shares of total and R/P ratios are calculated using million tonnes figures.

Prices

US dollars per tonne	Northwest Europe marker price†	US Central Appalachian coal spot price index‡	Japan steam spot cif price†	China Qinhuangdao spot price†
1996	41.25	29.86	–	–
1997	38.92	29.76	–	–
1998	32.00	31.00	–	–
1999	28.79	31.29	–	–
2000	35.99	29.90	–	27.52
2001	39.03	50.15	37.69	31.78
2002	31.65	33.20	31.47	33.19
2003	43.60	38.52	39.61	31.74
2004	72.08	64.90	74.22	42.76
2005	60.54	70.12	64.62	51.34
2006	64.11	62.96	65.22	53.53
2007	88.79	51.16	95.59	61.23
2008	147.67	118.79	157.88	104.97
2009	70.66	68.08	83.59	87.86
2010	92.50	71.63	108.47	110.08
2011	121.52	87.38	126.13	127.27
2012	92.50	72.06	100.30	111.89
2013	81.69	71.39	90.07	95.42
2014	75.38	69.00	76.13	84.12
2015	56.79	53.59	60.10	67.53
2016	59.87	53.56	71.66	71.35

†Source: IHS. Northwest Europe prices for 1996-2000 based on monthly data, 2001-2016 on weekly data. China prices for 2000-2005 based on monthly data, 2006-2016 on weekly data. China basis 5,500 kilocalories per kg NAR CFR. Japan basis = 6,000 kilocalories per kg NAR CIF.

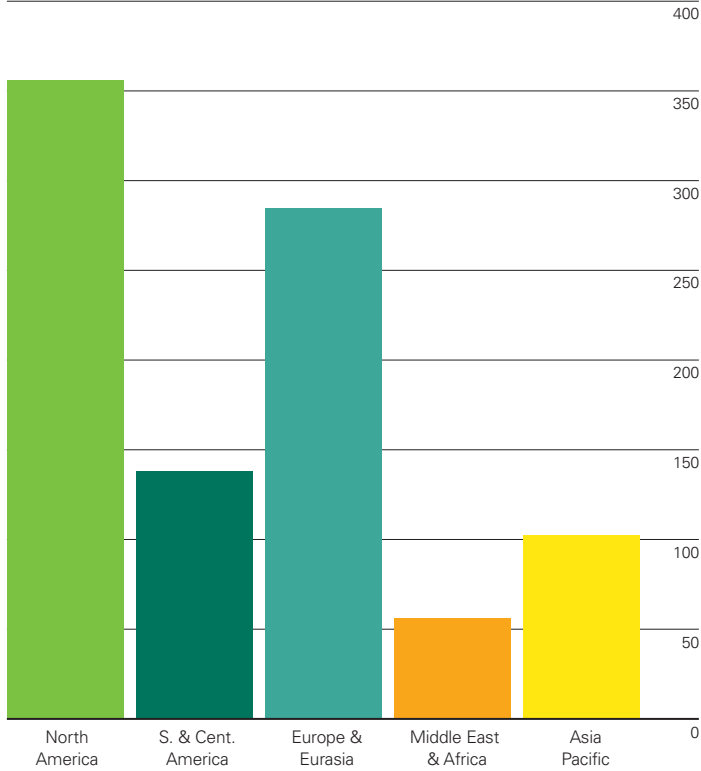
‡Source: Platts. Prices are for Central Appalachian 12,500 BTU, 1.2 SO₂ coal, FOB. Prices for 1996-2000 are by coal price publication date, 2001-2016 by coal price assessment date.

Note: cif = cost+insurance+freight (average prices); cfr = cost and freight; FOB = free on board.

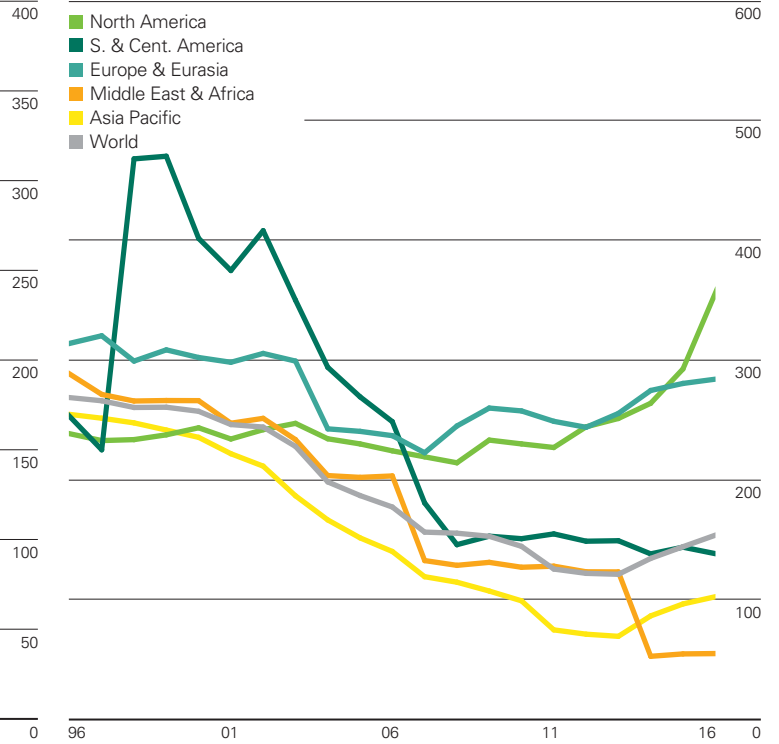
Reserves-to-production (R/P) ratios

Years

2016 by region



History

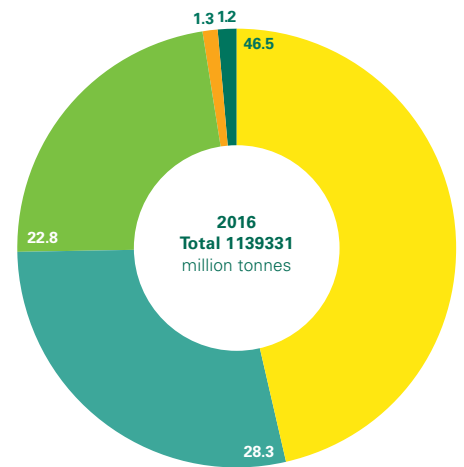
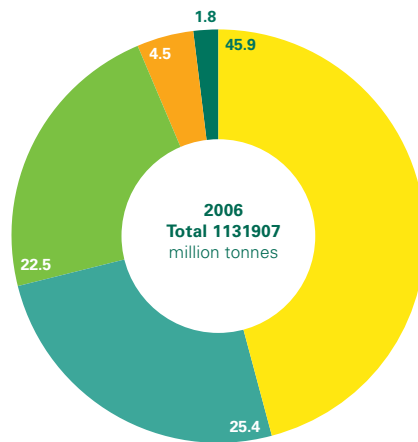
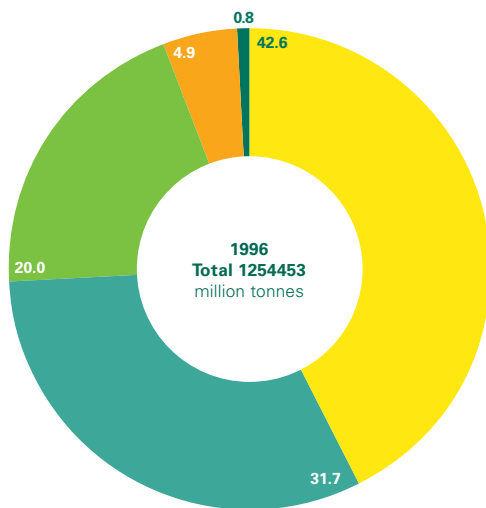


World proved coal reserves are currently sufficient to meet 153 years of global production, roughly three times the R/P ratio for oil and gas. By region, Asia Pacific holds the most proved reserves (46.5% of total), with China accounting for 21.4% of the global total. The US remains the largest reserve holder (22.1% of total).

Distribution of proved reserves in 1996, 2006 and 2016

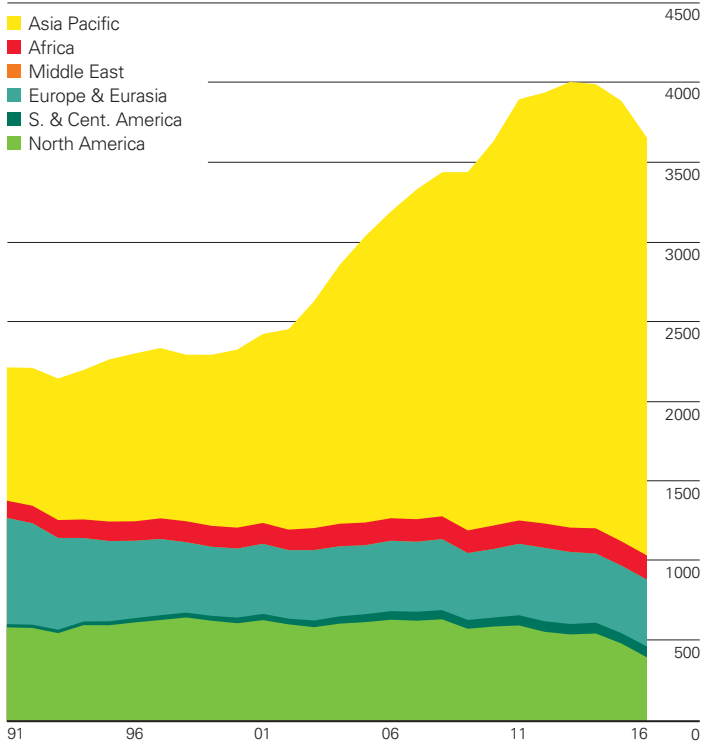
Percentage

- Asia Pacific
- Europe & Eurasia
- North America
- Middle East & Africa
- S. & Cent. America



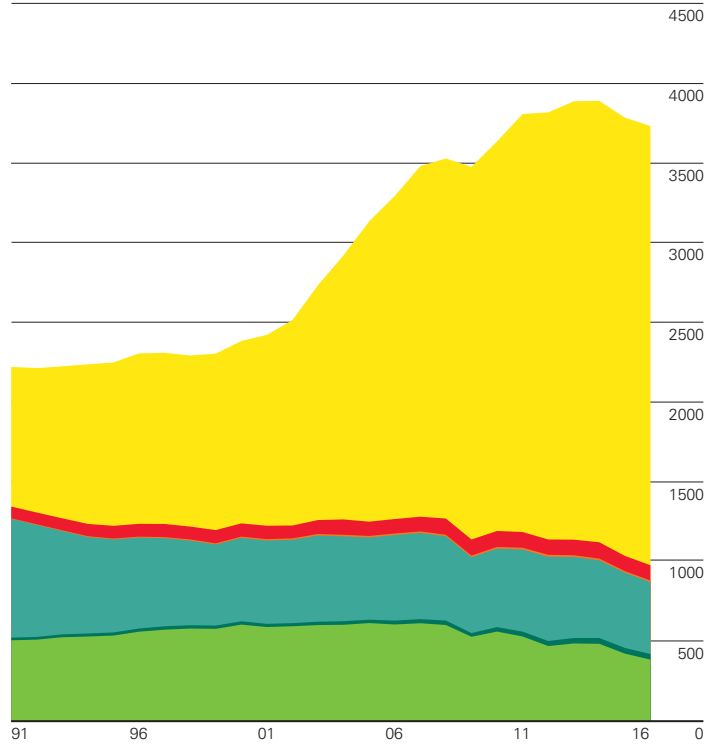
Coal: Production by region

Million tonnes oil equivalent



Coal: Consumption by region

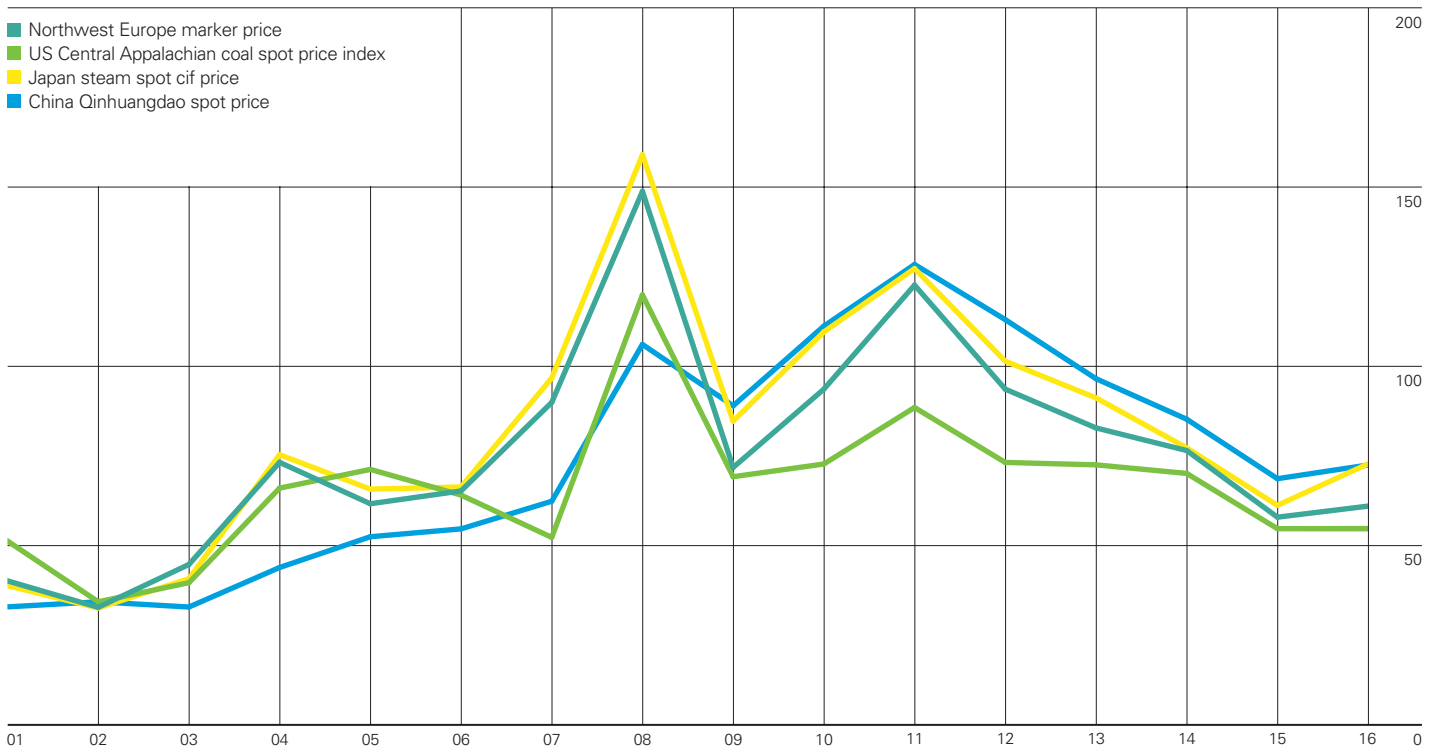
Million tonnes oil equivalent



World coal production fell by 6.2%, or 231 million tonnes of oil equivalent (mtoe) in 2016, the largest decline on record. China's production fell by 7.9% or 140 mtoe – also a record decline – while US production fell by 19% or 85 mtoe. Global coal consumption fell by 1.7%, the second successive decline. The largest decreases were seen in the US (-33 mtoe, an 8.8% fall), China (-26 mtoe, -1.6%) and the United Kingdom (-12 mtoe, -52.5%).

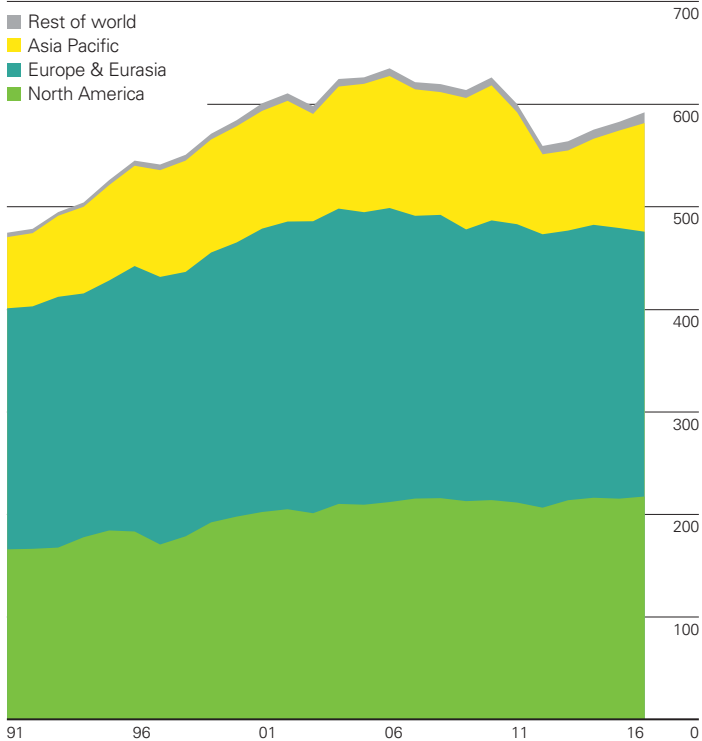
Coal prices

US dollars per tonne



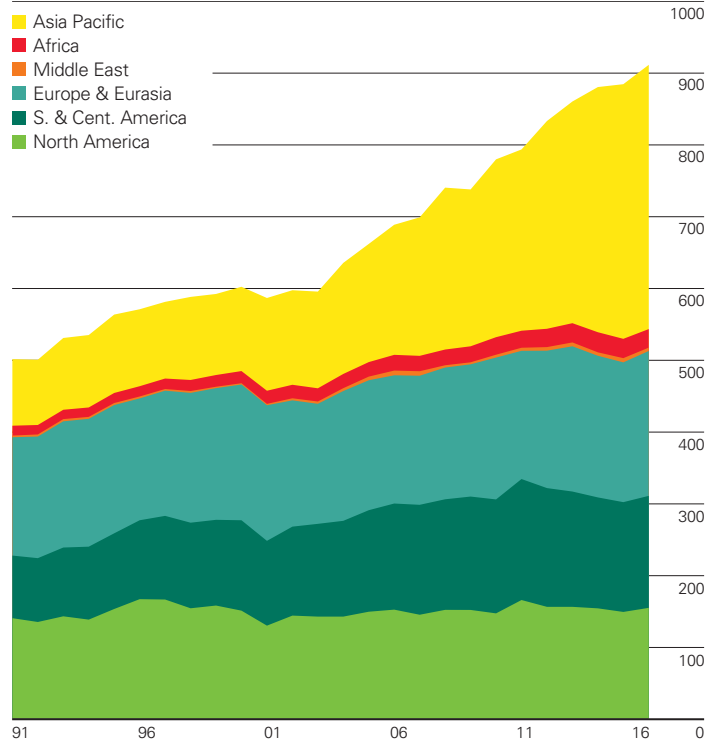
Nuclear energy consumption by region

Million tonnes oil equivalent



Hydroelectricity consumption by region

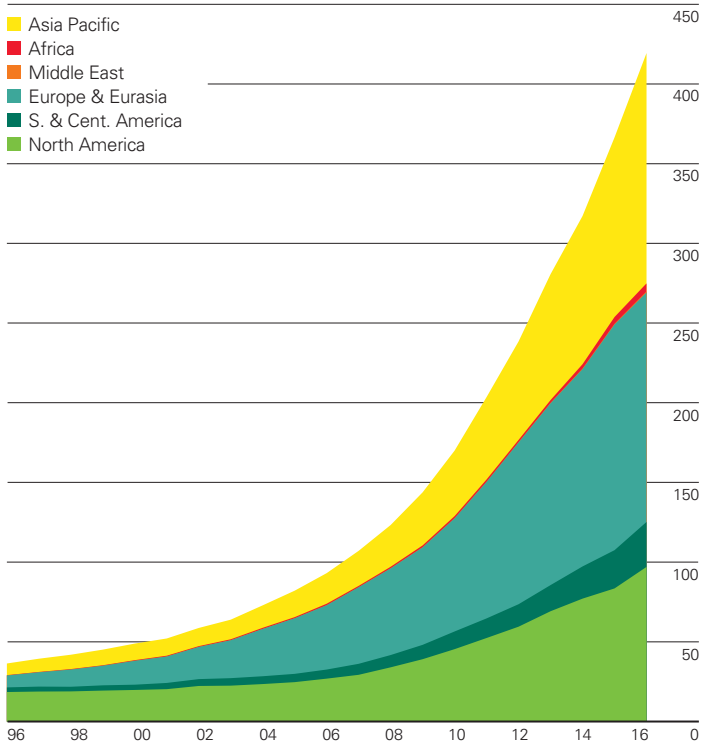
Million tonnes oil equivalent



Global nuclear power generation increased by 1.3% in 2016, or 9.3 million tonnes of oil equivalent (mtoe). China accounted for all of the net growth, expanding by 24.5% (9.6 mtoe). Generation in Japan and Belgium also grew strongly, while France saw a sharp decline (-8.1%, -7.7 mtoe). Hydroelectric power generation rose by 2.8% (27.1 mtoe), slightly below the 10-year average of 2.9%. China (4%, 10.9 mtoe) and Brazil (6.5%, 5.5 mtoe) were the largest contributors to growth.

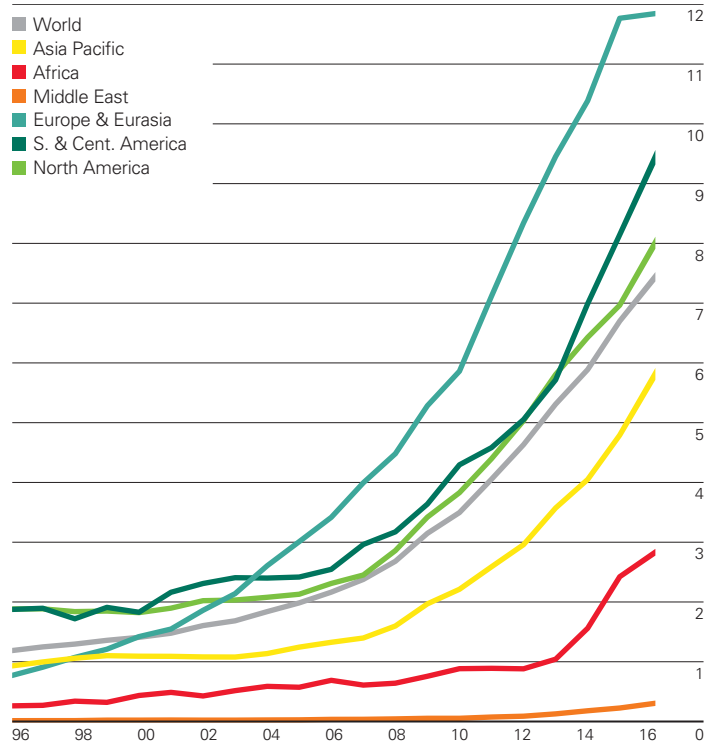
Other renewables consumption by region

Million tonnes oil equivalent



Other renewables share of power generation by region

Percentage



Renewable energy in power generation (not including hydro) grew by 14.1% in 2016, slightly below the 10-year average, but the largest increment on record (52.9 mtoe). Wind provided more than half of the growth, while solar energy contributed almost a third despite accounting for only 18% of the total. Asia Pacific contributed 60% of growth, with China overtaking the United States to become the world's largest renewable power producer. Renewable energy accounted for 7.5% of power generation, up from 6.7% in 2015. Europe & Eurasia has the highest share of power from renewables at 11.8%, but its share rose by the smallest increment on record in 2016.

Appendices

Approximate conversion factors

Crude oil*

From	To				
	tonnes (metric)	kilolitres	barrels	US gallons	tonnes per year
	Multiply by				
Tonnes (metric)	1	1.165	7.33	307.86	–
Kilolitres	0.8581	1	6.2898	264.17	–
Barrels	0.1364	0.159	1	42	–
US gallons	0.00325	0.0038	0.0238	1	–
Barrels per day	–	–	–	–	49.8

*Based on worldwide average gravity.

Products

	To convert			
	barrels to tonnes	tonnes to barrels	kilolitres to tonnes	tonnes to kilolitres
	Multiply by			
Liquefied petroleum gas (LPG)	0.086	11.60	0.542	1.844
Gasoline	0.120	8.35	0.753	1.328
Kerosene	0.127	7.88	0.798	1.253
Gas oil/diesel	0.134	7.46	0.843	1.186
Residual fuel oil	0.157	6.35	0.991	1.010
Product basket	0.125	7.98	0.788	1.269

Natural gas (NG) and liquefied natural gas (LNG)

From	To					
	billion cubic metres NG	billion cubic feet NG	million tonnes oil equivalent	million tonnes LNG	trillion British thermal units	million barrels oil equivalent
	Multiply by					
1 billion cubic metres NG	1	35.3	0.90	0.74	35.7	6.16
1 billion cubic feet NG	0.028	1	0.025	0.021	1.01	0.17
1 million tonnes oil equivalent	1.11	39.2	1	0.82	39.7	6.84
1 million tonnes LNG	1.36	48.0	1.22	1	48.6	8.37
1 trillion British thermal units	0.028	0.99	0.025	0.021	1	0.17
1 million barrels oil equivalent	0.16	5.74	0.15	0.12	5.80	1

Definitions

Statistics published in this review are taken from government sources and published data. No use is made of confidential information obtained by BP in the course of its business.

Country and geographic groupings

Country and geographic groupings are made purely for statistical purposes and are not intended to imply any judgement about political or economic standings.

North America

US (excluding US territories), Canada, Mexico.

South & Central America

Caribbean (including Puerto Rico and US Virgin Islands), Central and South America.

Europe

European members of the OECD plus Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, The former Yugoslav Republic of Macedonia, Georgia, Gibraltar, Latvia, Lithuania, Malta, Montenegro, Romania and Serbia.

Commonwealth of Independent States (CIS)

Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan.

Europe & Eurasia

All countries listed above under the headings Europe and CIS.

Middle East

Arabian Peninsula, Iran, Iraq, Israel, Jordan, Lebanon, Syria.

North Africa

Territories on the north coast of Africa from Egypt to western Sahara.

West Africa

Territories on the west coast of Africa from Mauritania to Angola, including Cape Verde, Chad.

East and Southern Africa

Territories on the east coast of Africa from Sudan to Republic of South Africa. Also Botswana, Madagascar, Malawi, Namibia, Uganda, Zambia, Zimbabwe.

Asia Pacific

Brunei, Cambodia, China, China Hong Kong SAR*, China Macau SAR*, Indonesia, Japan, Laos, Malaysia, Mongolia, North Korea, Philippines, Singapore, South Asia (Afghanistan, Bangladesh, India, Myanmar, Nepal, Pakistan, Sri Lanka), South Korea, Taiwan, Thailand, Vietnam, Australia, New Zealand, Papua New Guinea, Oceania.

*Special Administrative Region.

Australasia

Australia, New Zealand.

OECD members

Europe: Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, UK.

Other member countries: Australia, Canada, Chile, Israel, Japan, Mexico, New Zealand, South Korea, US.

OPEC members

Middle East: Iran, Iraq, Kuwait, Qatar, Saudi Arabia, United Arab Emirates.

North Africa: Algeria, Libya.

West Africa: Angola, Nigeria.

South America: Ecuador, Venezuela.

Units

1 metric tonne	= 2204.62lb
	= 1.1023 short tons
1 kilolitre	= 6.2898 barrels
	= 1 cubic metre
1 kilocalorie (kcal)	= 4.187kJ
	= 3.968Btu
1 kilojoule (kJ)	= 0.239kcal
	= 0.948Btu
1 British thermal unit (Btu)	= 0.252kcal
	= 1.055kJ
1 kilowatt-hour (kWh)	= 860kcal
	= 3600kJ
	= 3412Btu

Calorific equivalents

One tonne of oil equivalent equals approximately:

Heat units	10 million kilocalories
	42 gigajoules
	40 million British thermal units
Solid fuels	1.5 tonnes of hard coal
	3 tonnes of lignite and sub-bituminous coal
Gaseous fuels	See Natural gas and liquefied natural gas table
Electricity	12 megawatt-hours

One million tonnes of oil or oil equivalent produces about 4400 gigawatt-hours (= 4.4 terawatt-hours) of electricity in a modern power station.

1 barrel of ethanol = 0.58 barrels of oil equivalent
 1 barrel of biodiesel = 0.86 barrels of oil equivalent
 1 tonne of ethanol = 0.68 tonnes of oil equivalent
 1 tonne of biodiesel = 0.88 tonnes of oil equivalent

European Union members

Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, UK.

Non-OECD

All countries that are not members of the OECD.

Methodology

The primary energy values of nuclear and hydroelectric power generation, as well as electricity from renewable sources, have been derived by calculating the equivalent amount of fossil fuel required to generate the same volume of electricity in a thermal power station, assuming a conversion efficiency of 38% (the average for OECD thermal power generation).

Fuels used as inputs for conversion technologies (gas-to-liquids, coal-to-liquids and coal-to-gas) are counted as production for the source fuel and the outputs are counted as consumption for the converted fuel.

Percentages

Calculated before rounding of actuals.

Rounding differences

Because of rounding, some totals may not agree exactly with the sum of their component parts.

Tonnes

Metric equivalent of tons.

More information

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