



Statistical Review of World Energy

2020 | 69th edition





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Contents

Introduction

- 2 Chief executive officer's introduction
- 3 2019 at a glance
- 4 The year in review

1 Primary energy

- 8 Consumption
- 9 Consumption by fuel
- 11 Consumption per capita

Carbon

- 13 Carbon dioxide emissions

Oil

- 14 Reserves
- 16 Production
- 20 Consumption
- 26 Prices
- 28 Refining
- 30 Trade movements

Natural gas

- 32 Reserves
- 34 Production
- 36 Consumption
- 39 Prices
- 40 Trade movements

Coal

- 44 Reserves
- 46 Production
- 47 Consumption
- 49 Prices and trade movements

Nuclear energy

- 50 Consumption

Hydroelectricity

- 51 Consumption

Renewable energy

- 53 Renewables consumption
- 55 Generation by source
- 56 Biofuels production
- 57 Biofuels consumption

Electricity

- 59 Generation
- 61 Generation by fuel

Key minerals

- 62 Production
- 63 Reserves
- 63 Prices

Appendices

- 64 Approximate conversion factors
- 64 Methodology
- 65 Definitions
- 65 More information

Methodology

This year we have made the following two methodological changes: first, energy units have been changed from million tonnes of oil equivalent to exajoules. Second, the method for estimating primary energy consumption of non-fossil sources of electricity, has been revised. This is still based on an 'input-equivalence' method, i.e. on the amount of fuel that would be required by a standard thermal power station to generate the reported electricity output. However the thermal efficiency assumed for that standard power plant is no longer fixed. The efficiency assumption rises each year to better reflect real world improvements in the average power station thermal efficiency. For more details see the appendix, or visit: www.bp.com/statisticalreview.

Chief executive officer's introduction



The COVID-19 pandemic may well turn out to be the most tragic and disruptive event that many of us will ever live through. As I write this – in the middle of June – over 400 thousand people globally have lost their lives to the infection. Millions more might have done so without the widespread lockdown of economies across the world, which came at huge economic and social cost.

This combined health and economic shock is bound to reshape the global economic, political and social environment in which we all live and work. It has the potential to accelerate emerging trends and create opportunities to shift the world onto a more sustainable path. But it also risks slowing progress if the short-term, domestic issues raised by COVID-19 are prioritized over long-term, global challenges, such as climate change. It feels like the world is at a pivotal moment: it needs to address these short-term concerns but in a way that builds back better.

“
The technologies required to reach net zero exist today – the challenge is to use them at pace and scale, and I remain optimistic that we can make this happen.”

In that context, this year's edition of bp's Statistical Review of World Energy provides a timely reminder of global energy trends prior to the crisis.

Some aspects are encouraging – particularly the continuing strong growth of renewable energy. Led by wind and solar power, renewable energy increased by a record amount, accounting for over 40% of the growth in primary energy in 2019. At the same time, coal consumption fell for the fourth time in the past six years, with its share in the global energy mix falling to its lowest level for 16 years.

But other aspects of the energy system continued to give cause for concern. Despite last year's decline, coal was still the single largest source of power generation, accounting for over 36% of global power.

That compares with just 10% provided by renewable energy. Renewables will need to grow even more strongly over the next three decades to decarbonize the power sector.

More worrying is the trend for carbon emissions. The slowing in the growth of carbon emissions to 0.5% in 2019 may suggest some grounds for optimism. But this deceleration needs to be seen in the context of the big increase in carbon emissions in 2018 of 2.1%. The hope was that as the one-off factors boosting carbon emissions in 2018 unwound, carbon emissions would fall significantly. That fall did not happen. The average annual growth in carbon emissions over 2018 and 2019 was greater than its 10-year average. As the world emerges from the COVID-19 crisis it needs to make decisive changes to move to a more sustainable path.

The disruption to our everyday lives caused by the lockdowns has provided a glimpse of a cleaner, lower carbon world: air quality in many of the world's most polluted cities has improved; skies have become clearer. The IEA (International Energy Agency) estimate that global CO₂ emissions may fall by as much as 2.6 gigatonnes this year. That has come at considerable cost and as economies restart and our lives return to normal there is a risk that these gains will be lost.

But to get to net zero by 2050, the world requires similar-sized reductions in carbon emissions every other year for the next 25 years. This can be achieved only by a radical shift in all our behaviours. By using resources and energy more efficiently. And by implementing the full range of zero and low carbon energies and technologies at our disposal – including renewable energies, electrification, hydrogen, CCUS (carbon capture use and storage), bioenergy and many more. These technologies exist today – the challenge is to use them at pace and scale.

At bp, we are committed to playing our part. In February, we adopted a new purpose – to reimagine energy for people and our planet. And we announced a new ambition, to be a net zero company by 2050 or sooner and to help the world get to net zero. The experience of COVID-19 has only reinforced our commitment to this purpose and ambition, by highlighting both the fragility of our planet and the opportunities it provides to truly build back better.

As bp along with the rest of the world navigate the energy transition, we will need timely, objective and comprehensive data on the global energy system. That is the role that the Statistical Review has been playing for the past 69 years and will continue to play in the future.

I hope this year's Statistical Review is useful to everyone else seeking ways to get to net zero and build back better. And I would like to thank the very many people who help our economics team in compiling it, including the governments and statistical agencies around the world who have contributed their official data again this year. The Statistical Review would not be possible without your generous co-operation and transparency. Thank you.

A handwritten signature in black ink, reading "Bernard Looney". The signature is stylized and written in a cursive-like font.

Bernard Looney
Chief executive officer
June 2020

2019 at a glance

Growth in carbon emissions in 2019 slowed from the sharp increase seen in the previous year, as primary energy consumption decelerated and renewables and natural gas displaced coal from the energy mix.

Energy developments

- Primary energy consumption growth slowed to 1.3% last year, less than half the rate of growth in 2018 (2.8%).
- The increase in energy consumption was driven by renewables and natural gas, which together contributed three quarters of the expansion. All fuels grew at a slower rate than their 10-year averages, apart from nuclear.
- By country, China was by far the biggest driver of energy, accounting for more than three quarters of net global growth. India and Indonesia were the next largest contributors to growth, while the US and Germany posted the largest declines.

Carbon emissions

- Carbon emissions from energy use grew by 0.5%, less than half 10-year average growth of 1.1% per year, partially reversing some of the unusually strong increase in 2018 (2.1%).

Oil

- Oil consumption grew by a below average 0.9 million barrels per day (b/d), or 0.9%. Demand for all liquid fuels (including biofuels) rose by 1.1 million b/d and topped 100 million b/d for the first time.
- Oil consumption growth was led by China (680,000 b/d) and other emerging economies, while demand fell in the OECD (-290,000 b/d).
- Global oil production fell by 60,000 b/d as strong growth in US output (1.7 million b/d) was more than offset by a decline in OPEC production (-2 million b/d), with sharp declines in Iran (-1.3 million b/d) Venezuela (-560,000 b/d) and Saudi Arabia (-430,000 b/d).
- Refinery utilization fell sharply by 1.2 percentage points as capacity rose by 1.5 million b/d and throughput remained relatively unchanged.

+1.3%

Growth of global primary energy consumption, less than half the growth rate in 2018.



Natural gas

- Natural gas consumption increased by 78 billion cubic metres (bcm), or 2%, well below the exceptional growth seen in 2018 (5.3%). Nevertheless, the share of gas in primary energy rose to a record high of 24.2%.
- Increases in gas demand were driven by the US (27 bcm) and China (24 bcm), while Russia and Japan saw the largest declines (10 and 8 bcm respectively).
- Gas production grew by 132 bcm (3.4%), with the US accounting for almost two-thirds of this increase (85 bcm). Australia (23 bcm) and China (16 bcm) were also key contributors to growth.
- Inter-regional gas trade expanded at a rate of 4.9%, more than double its 10-year average, driven by a record increase in liquefied natural gas (LNG) of 54 bcm (12.7%).
- LNG supply growth was led by the US (19 bcm) and Russia (14 bcm), with most incremental supplies heading to Europe: European LNG imports (+49 bcm) rose by more than two-thirds.

Coal

- Coal consumption declined by 0.6% and its share in primary energy fell to its lowest level in 16 years (27%).
- Increases in coal consumption were driven by the emerging economies, particularly China (1.8 EJ) and Indonesia (0.6 EJ). However, this was outweighed by a sharp fall in OECD demand which fell to its lowest level in our data series (which starts in 1965).
- Global coal production rose by 1.5%, with China and Indonesia providing the only significant increases (3.2 EJ and 1.3 EJ respectively). The largest declines came from the US (-1.1 EJ) and Germany (-0.3 EJ).

Renewables, hydro and nuclear

- Renewable energy (including biofuels) posted a record increase in consumption in energy terms (3.2 EJ). This was also the largest increment for any source of energy in 2019.
- Wind provided the largest contribution to renewables growth (1.4 EJ) followed closely by solar (1.2 EJ).
- By country, China was the largest contributor to renewables growth (0.8 EJ), followed by the US (0.3 EJ) and Japan (0.2 EJ).
- Hydroelectric consumption rose by a below average 0.8%, with growth led by China (0.6 EJ), Turkey (0.3 EJ) and India (0.2 EJ).
- Nuclear consumption rose by 3.2% (0.8 EJ), its fastest growth since 2004. China (0.5 EJ) and Japan (0.1 EJ) provided the largest increments.

Electricity

- Electricity generation grew by only 1.3% – around half its 10-year average. China accounted for more than 90% of net global growth.
- Renewables provided the largest increment to power generation, followed by natural gas while coal generation fell.
- The share of renewables in power generation increased from 9.3% to 10.4%, surpassing nuclear for the first time. Coal's share of generation fell 1.5 percentage points to 36.4% – the lowest in our data set (which starts in 1985).

Key minerals

- Prices for cobalt and lithium carbonate fell sharply, by 54% and 31% respectively.
- Cobalt production was down 21.2%, largely due to a decline in the Democratic Republic of Congo. Lithium production fell 19.2%, driven mainly by lower Australian output.

The year in review

Introduction

Growth in energy markets slowed in 2019 in line with weaker economic growth and a partial unwinding of some of the one-off factors that boosted energy demand in 2018. This slowdown was particularly evident in the US, Russia and India, each of which exhibited unusually strong growth in 2018.

China was the exception, with its energy consumption accelerating in 2019. As a result, China dominated the expansion in global energy markets – contributing the largest increment to demand for each individual source of energy other than natural gas, where it was only narrowly surpassed by the US.

Despite the support from China, all fuels (other than nuclear) grew at a slower rate than their 10-year averages, with coal consumption declining for the fourth time in six years. Nevertheless, renewables still grew by a record increment and provided the largest contribution (41%) to growth in primary energy, with the level of renewable power generation exceeding nuclear power for the first time.

The slowdown in energy demand growth, combined with a shift in the fuel mix away from coal and toward natural gas and renewables, led to a significant slowing in the growth of carbon emissions, although only partially unwinding the unusually strong increase seen in 2018.

Energy prices fell on the whole, particularly for coal and gas where growth in production outpaced consumption leading to a build up of inventories. Oil prices were a little lower.



Primary energy and carbon emissions

Primary energy consumption rose by 1.3% last year, below its 10-year average rate of 1.6% per year, and much weaker than the 2.8% growth seen in 2018. By region, consumption fell in North America, Europe and CIS and growth was below average in South & Central America. Demand growth in Africa, Middle East and Asia was roughly in line with historical averages.

China was by far the biggest individual driver of primary energy growth, accounting for more than three quarters of net global growth. India and Indonesia were the next largest contributors, while the US and Germany posted the largest declines in energy terms.

Looking at energy by fuel, 2019 growth was driven by renewables, followed by natural gas, which together contributed over three quarters of the net increase. The share of both renewables and natural gas in primary energy increased to record highs. Meanwhile, coal consumption declined, with its share in the energy mix falling to its lowest level since 2003.

The combination of slower growth in energy demand and a shift in the fuel mix away from coal and toward natural gas and renewables led to a significant slowdown in the growth of carbon emissions. Emissions rose by 0.5%, although slower than their 10-year average, it only partially unwound the unusually strong growth of 2.1% seen in 2018.

Table 1: Fuel shares of primary energy and contributions to growth in 2019

Energy source	Consumption (exajoules)	Annual change (exajoules)	Share of primary energy	Percentage point change in share from 2018
Oil	193.0	1.6	33.1%	-0.2%
Gas	141.5	2.8	24.2%	0.2%
Coal	157.9	-0.9	27.0%	-0.5%
Renewables*	29.0	3.2	5.0%	0.5%
Hydro	37.6	0.3	6.4%	-0.0%
Nuclear	24.9	0.8	4.3%	0.1%
Total	583.9	7.7		

*Renewable power (excluding hydro) plus biofuels

41%

Renewables' contribution to the increase in energy demand, the largest of any energy source



Oil

Oil consumption grew by 0.9 million barrels per day (b/d), or 0.9% slightly lower than the 10-year average of 1.3% p.a.. Growth was led by China, where demand rose by 680,000 b/d, the largest increase in the country's demand since 2015. Elsewhere in the developing world, growth was below average, with Iran (180,000 b/d) the only major exception. OECD demand fell by 290,000 b/d, the first decline since 2014.

By product, consumption growth was led by ethane and LPG (380,000 b/d), helped by the substitution of naphtha in petrochemicals, with naphtha demand down slightly (-15,000 b/d). Diesel grew a little above average (360,000 b/d) as preparations for the International Maritime Organisation's bunker fuel sulphur specification change in 2020 lifted marine diesel demand. In contrast, this shift reduced demand for high sulphur fuel oil, contributing to a 320,000 b/d decline in fuel oil consumption.

Oil production fell slightly by 60,000 b/d in 2019 as strong non-OPEC production growth, led by the US, was offset by a sharp decline in OPEC production.

The US posted the largest increase of any country for the third consecutive year, with its output rising by a massive 1.7 million b/d, although this was down from the record increase in 2018 (2.2 million b/d). There was also significant growth from Brazil (200,000 b/d) and Canada (150,000 b/d), although in the latter's case, this was a pronounced slowdown in growth compared to 2017 and 2018.

OPEC production fell by 2 million b/d, the group's steepest decline since 2009. Much of this decline was driven by a combination of sanctions and economic difficulties in Iran (-1.3 million b/d) and Venezuela (-560,000 b/d). In addition, a renewed OPEC+ production cut agreement reduced other countries' output levels, with Saudi Arabia's production falling (430,000 b/d). Despite this agreement, the production of some OPEC members increased, notably Iraq and Nigeria, which increased their production by 150,000 and 100,000 b/d respectively.

Looking at oil production by type, declines were concentrated in crude oil and condensate, which together fell by 580,000 b/d. Natural gas liquids (NGLs) continued to grow robustly, by 520,000 b/d (4.5%), in line with its



long-run trend. As has been the case in the last few years, NGLs output growth was driven primarily by the US (440,000 b/d), which has doubled its production between 2012 and 2019 to 4.8 million b/d.

Oil prices edged a little lower last year, with Dated Brent averaging \$64.21/bbl compared with \$71.31/bbl in 2018.

Refining and trade

Refinery throughput barely grew at the global level (30,000 b/d), held back by a slowing in oil consumption growth and robust growth in NGLs supplies. China was again the exception, with its crude runs growing by a record high of 950,000 b/d as new refineries ramped up. Throughput declined in most other regions, in particular the US (-400,000 b/d) and South & Central America (-300,000 b/d), with the latter region posting its sixth consecutive annual decline.

Refining capacity rose by 1.5 million b/d, the largest increase since 2009. Growth was driven by additions in China (540,000 b/d) the Middle East (310,000 b/d) and the US (210,000 b/d) as well as by a record low level of refinery closures. Global refinery utilization fell sharply, dropping by 1.2 percentage points to 82.5%, the largest annual decline since 2009.

Refining margins were slightly lower, with the average of the three region margins tracked in this book (US Gulf Coast, Northwest Europe and Singapore) falling from \$5.4/bbl in 2018 to \$4.7/bbl.

Oil trade fell by 230,000 b/d (0.3%) – the first decline since the financial crisis in 2009. Most of this decline was concentrated in crude oil trade: a sharp fall in Middle East crude exports (-1.4 million b/d), mainly due to Iranian sanctions, was only partially offset by continued growth in US crude exports (0.9 million b/d), while falling US crude imports (-1 million b/d) broadly offset strong growth in Chinese purchases (0.9 million b/d). Overall, net oil imports into the US (including products) fell by 1.8 million b/d to only 1.1 million b/d, down from net imports of 9.5 million b/d ten years earlier.

Table 2: Top five increases and decreases in oil consumption and production

Oil consumption	Annual change (thousand b/d)	Oil production	Annual change (thousand b/d)
Increases		Increases	
China	681	US	1685
Iran	183	Brazil	198
India	159	Canada	150
Algeria	37	Iraq	148
Russia	35	Australia	135
Decreases		Decreases	
Mexico	-88	Iran	-1266
Italy	-59	Venezuela	-556
Pakistan	-52	Saudi Arabia	-429
Taiwan	-52	Mexico	-150
Venezuela	-47	Norway	-115

2 million b/d

Decline in OPEC oil production, the largest decline since 2009



Table 3: Top increases and decreases in LNG exports and imports

LNG exports	Annual change (bcm)	LNG imports	Annual change (bcm)
Increases		Increases	
US	18.9	China	11.3
Russia	14.4	United Kingdom	10.9
Australia	12.9	France	10.1
Algeria	3.5	Spain	6.9
Egypt	2.6	Italy	5.3
Decreases		Decreases	
Indonesia	-4.3	Japan	-7.5
		South Korea	-4.6
		Egypt	-3.2
		Argentina	-1.9
		Chile	-1.0

Natural gas

Consumption and production

Global natural gas consumption growth averaged 2% in 2019, below its 10-year average and down sharply from the exceptional growth seen in 2018 (5.3%). In volume terms, demand grew by 78 billion cubic metres (bcm), led by the US (27 bcm) and China (24 bcm).

The growth in US and Chinese gas consumption was much slower than in 2018, as the boost from weather effects and policy driven coal-to-gas switching in China faded. A reduction in the number of unusually hot and cold days also contributed to a fall in Russia's gas consumption (10 bcm) – the largest decline of any country last year.

Gas production grew by 132 bcm (3.4%) outpacing growth in consumption. The US accounted for almost two thirds of net global growth, with the volumetric increase of 85 bcm just shy of 2018's record increment (90 bcm). Supply was also boosted by strong growth in Australia (23 bcm) and China (16 bcm).

Trade

Much of last year's increase in gas production was used to feed additional exports of liquefied natural gas (LNG). LNG exports grew by 54 bcm (12.7%) last year, the largest annual increase ever, driven by record increases from the US (19 bcm) and Russia (14 bcm) as well as continued growth from Australia (13 bcm).

On the LNG import side, nearly all incremental supplies headed to Europe, in contrast to 2018 when Asia drove import growth. European LNG imports rose by 49 bcm, representing an unprecedented 68% increase. Growth was widespread, with the UK (11 bcm), France (10 bcm) and Spain (7 bcm) the largest individual contributors.

The rapid growth in LNG led to a 4.9% increase in overall inter-regional gas trade, a rate more than double its 10-year average. This is despite a 1.7% decline in pipeline trade (-9 bcm) as pipeline imports into Europe from Russia and North Africa were partially crowded out by the abundance of LNG supplies.

Prices

With production growth outpacing growth in consumption by a considerable margin, storage levels rose in most regions and prices fell sharply. US Henry Hub prices dropped almost 20% to average \$2.53/mmBtu, while European and Asian prices, as measured by the UK NBP index and the Japan Korea Marker, fell by more than 40% (averaging \$4.47/mmBtu and \$5.49/mmBtu respectively). Prices in Europe, the region most affected by LNG oversupply, fell to their lowest levels since 2004.

Coal

Consumption and production

World coal consumption fell by 0.6% (-0.9 exajoules, or EJ), its fourth decline in six years, displaced by natural gas and renewables, particularly in the power sector (see electricity section). As a result, coal's share in the energy mix fell to 27.0%, its lowest level in 16 years.

Coal consumption continued to increase in some emerging economies, particularly in China (1.8 EJ), Indonesia (0.6 EJ) and Vietnam (0.5 EJ), with the latter posting a record increase in part related to a sharp drop in hydroelectric power. Growth in India, usually a key driver of coal consumption, was only 0.3% (0.1 EJ) – its lowest since 2001. These increases in coal consumption were more than offset by falls in demand in the developed world, led by the US (-1.9 EJ) and Germany (-0.6 EJ), with OECD coal consumption falling to its lowest level in our data series (which goes back to 1965).

Global coal production rose by 1.5%, with China and Indonesia providing the only significant increases (3.2 EJ and 1.3 EJ respectively). As with consumption, the largest declines in production came from the US (-1.1 EJ) and Germany (-0.3 EJ).

Coal prices fell last year, with the Northwest Europe and Chinese marker prices declining by 34% and 14% respectively (to \$60.86/t and \$85.89/t).

54 bcm

Increase in liquefied natural gas supplies, the largest increase on record



Coal trade

Coal trade decreased by 1.3%, the first decline since 2015. Notable declines in exports came from the US (-0.5 EJ), Australia (-0.4 EJ) and Colombia (-0.3 EJ) with strong growth in exports seen only in Indonesia (0.6 EJ). On the import side, falling imports in Europe (-1.2 EJ) and Japan & South Korea (-0.3 EJ combined) outweighed growth in the rest of Asia (1.3 EJ).

Renewables, hydroelectricity and nuclear

Renewables

Renewables energy consumption (which includes biofuels and all traded renewable electricity apart from hydro) continued to grow strongly, contributing its largest increase in energy terms (3.2 EJ) on record. This accounted for over 40% of the global growth in primary energy last year, which is larger than any other fuel. As a result, renewables increased its share in the energy mix from 4.5% in 2018 to 5%.

By energy source, wind generation provided the largest contribution to growth (1.4 EJ) followed closely by solar (1.2 EJ). Other sources of renewable electricity (such as biomass and geothermal) grew by 0.3 EJ, while biofuels consumption increased by 0.2 EJ, or 100,000 barrels of oil equivalent per day.

China's use of renewables grew by more than any other country, although its increase of 0.8 EJ was below the strong rate of growth seen in 2017 and 2018 (1.2 EJ both years). Solar provided half of China's growth, followed by wind (around 40%). The US (0.3 EJ) and Japan (0.2 EJ) were the next largest individual contributors to growth.

Hydroelectricity and nuclear

Hydroelectric consumption rose by 0.8%, below its 10-year average of 1.9% p.a.. Growth was led by China (0.6 EJ), Turkey (0.3 EJ) and India (0.2 EJ). The US and Vietnam saw the biggest declines (both -0.2 EJ).

Nuclear consumption increased by 3.2%, its fastest growth since 2004 and well above the 10-year average of -0.7% p.a.. As in 2018, China recorded the largest increment of any country and, last year, it was also its biggest increase ever (0.5 EJ). Japan also posted notable growth of 0.15 EJ (33%) as it continued to recover from the impact of the Fukushima incident in 2011.

Table 4: Renewables share of primary energy in key countries and regions

Renewables share of primary energy	Share in 2019	Percentage point change from 2018
US	6.2%	0.4%
Other North America	4.0%	0.7%
Brazil	16.3%	1.2%
Other S. & Cent. America	4.3%	0.7%
EU	11.0%	1.0%
Other Europe	4.3%	0.7%
CIS	0.1%	0.0%
Middle East	0.3%	0.1%
Africa	2.0%	0.5%
OECD Asia	5.0%	0.9%
China	4.7%	0.4%
Other Asia	2.9%	0.4%
World	5.0%	0.5%

10.4%

Share of renewables in electricity generation, higher than nuclear for the first time



Electricity

Generation of electricity grew by only 1.3% last year, around half of its 10-year average. Growth was weak or negative in most regions, other than in China which increased by 340 TWh (4.7%), accounting for 95% of net global growth (360 TWh).

Renewables provided the largest increment to power generation (340 TWh), followed by natural gas (220 TWh). These gains came partially at the expense of coal generation which fell sharply (-270 TWh), causing the share of coal in power generation to fall by 1.5 percentage points to 36.4% – the lowest in our dataset (which goes back to 1985). Despite this, coal remained the single largest source of power generation in 2019. Meanwhile, the share of renewables in generation increased from 9.3% to 10.4%, surpassing nuclear generation for the first time.

Key minerals

After steep rises in prices for cobalt and lithium in 2017 and 2018, prices fell back sharply last year. Cobalt prices declined by over 50% while lithium carbonate prices slipped 31%. Production responded quickly to the drop in prices, with cobalt production down 21.2%, largely due to a decline in the Democratic Republic of Congo. Lithium production fell 19.2%, driven mainly by lower Australian output.

Production of graphite and rare earth metals continued to ramp up, both growing around 12%. Graphite growth was driven largely by China and Mozambique, while rare earth output was lifted by China and the US, with the latter increasing output by 44% and leapfrogging Australia to become the world's number two producer behind China.

In detail

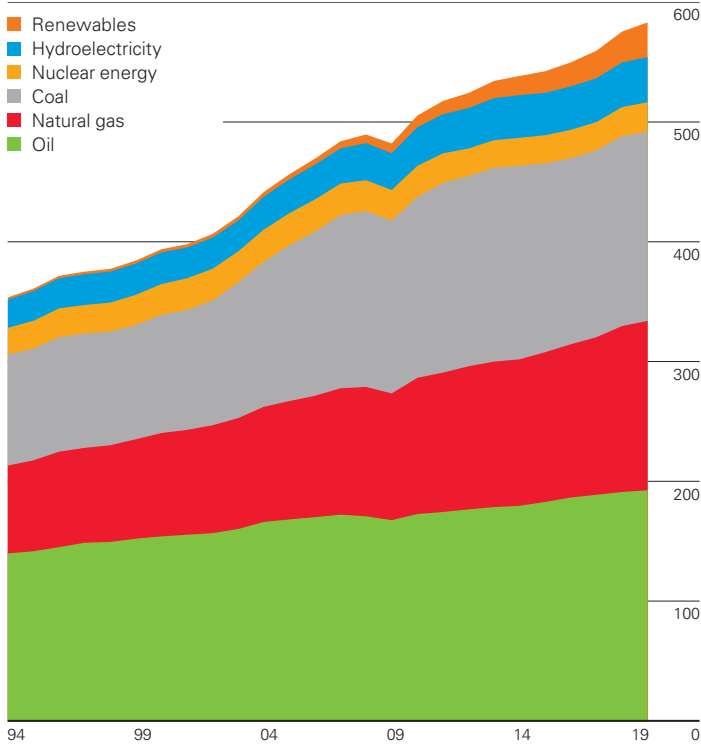
As well as the change to reported energy units (from million tonnes of oil equivalent to exajoules) there have been the following changes in the tables: biofuels consumption has been broken out of oil consumption and is now included in renewables consumption (as well as reported separately in its own table). Oil consumption as defined in previous Statistical Reviews (i.e. including biofuels) has been renamed 'liquids' consumption and a table is still included on this original basis. In addition, more granularity has been included on the product split of both oil products and biofuels (breaking out ethane & LPG and naphtha in oil products and the ethanol/biodiesel split of biofuels).

Acknowledgements

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World consumption

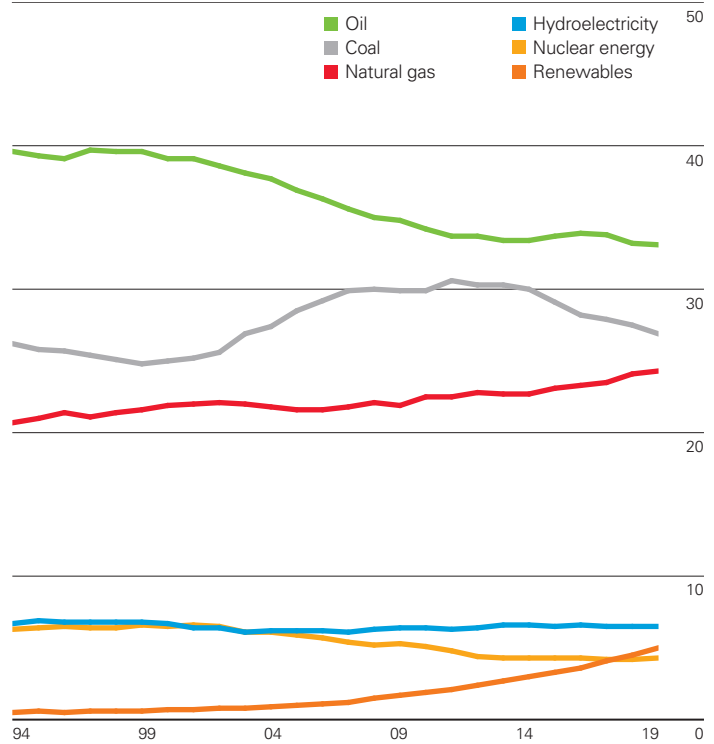
Exajoules



Primary energy consumption rose by 1.3% last year, less than half its rate in 2018 (2.8%). Growth was driven by renewables (3.2 EJ) and natural gas (2.8 EJ), which together contributed three quarters of the increase. All fuels grew at a slower rate than their 10-year averages, apart from nuclear, with coal consumption falling for the fourth time in six years (-0.9 EJ). By region, consumption fell in North America, Europe and CIS and growth was below average in South & Central America. In the other regions, growth was roughly in line with historical averages. China was the biggest individual driver of primary energy growth, accounting for more than three quarters of net global growth.

Shares of global primary energy

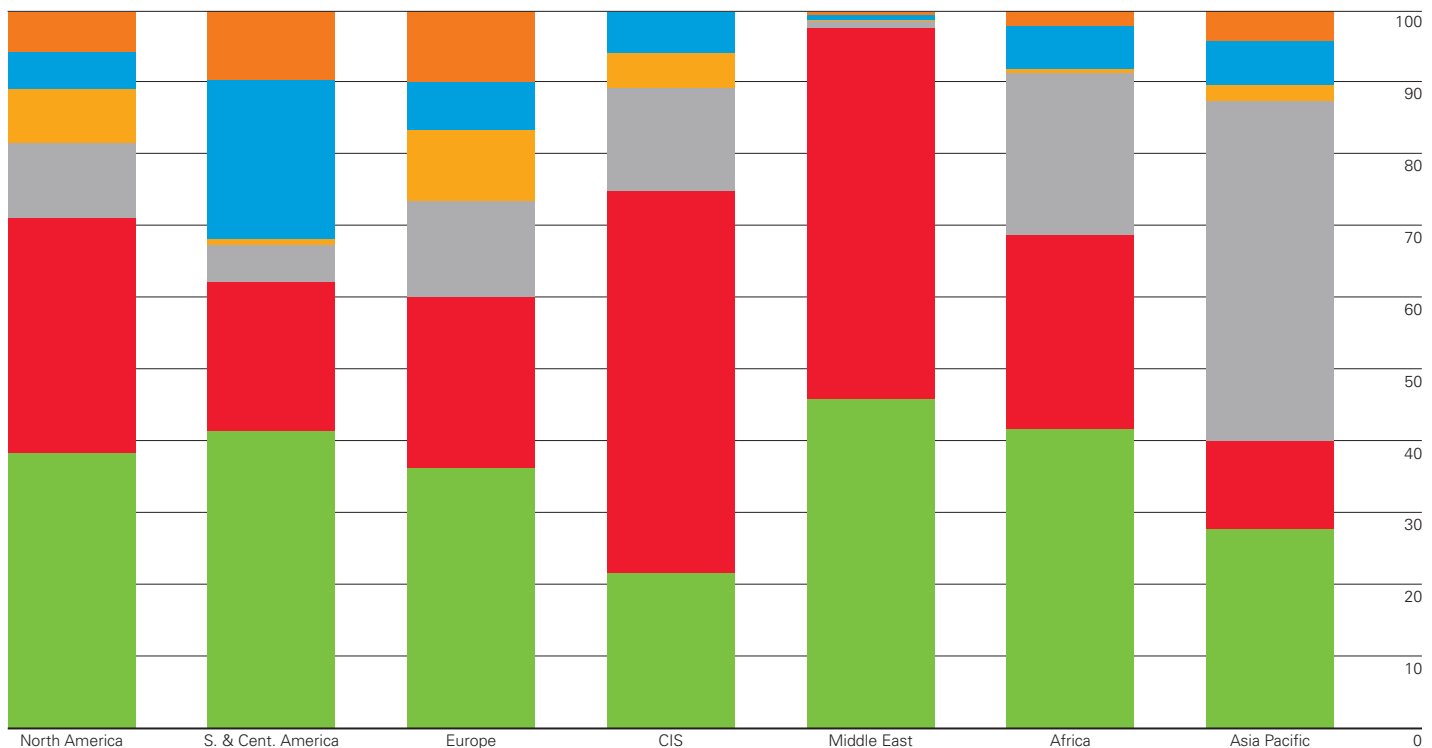
Percentage



Oil continues to hold the largest share of the energy mix (33.1%). Coal is the second largest fuel but lost share in 2019 to account for 27.0%, its lowest level since 2003. The share of both natural gas and renewables rose to record highs of 24.2% and 5.0% respectively. Renewables has now overtaken nuclear which makes up only 4.3% of the energy mix. The share of hydroelectricity has been stable at around 6% for several years.

Regional consumption pattern 2019

Percentage

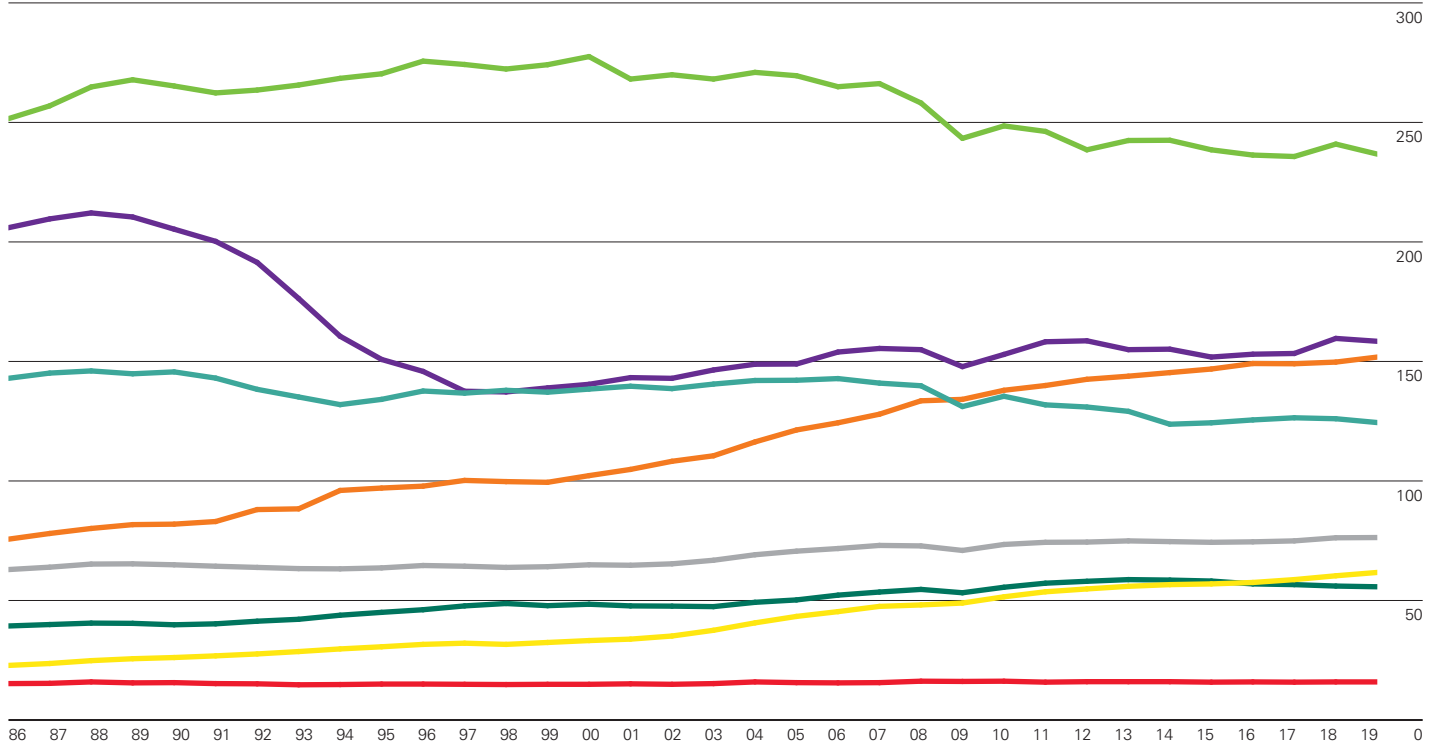


Oil remains the dominant fuel in Africa, Europe and the Americas, while natural gas dominates in CIS and the Middle East, accounting for more than half of the energy mix in both regions. Coal is the dominant fuel in the Asia Pacific region. In 2019 coal's share of primary energy fell to its lowest level in our data series in North America and Europe.

Energy per capita by region

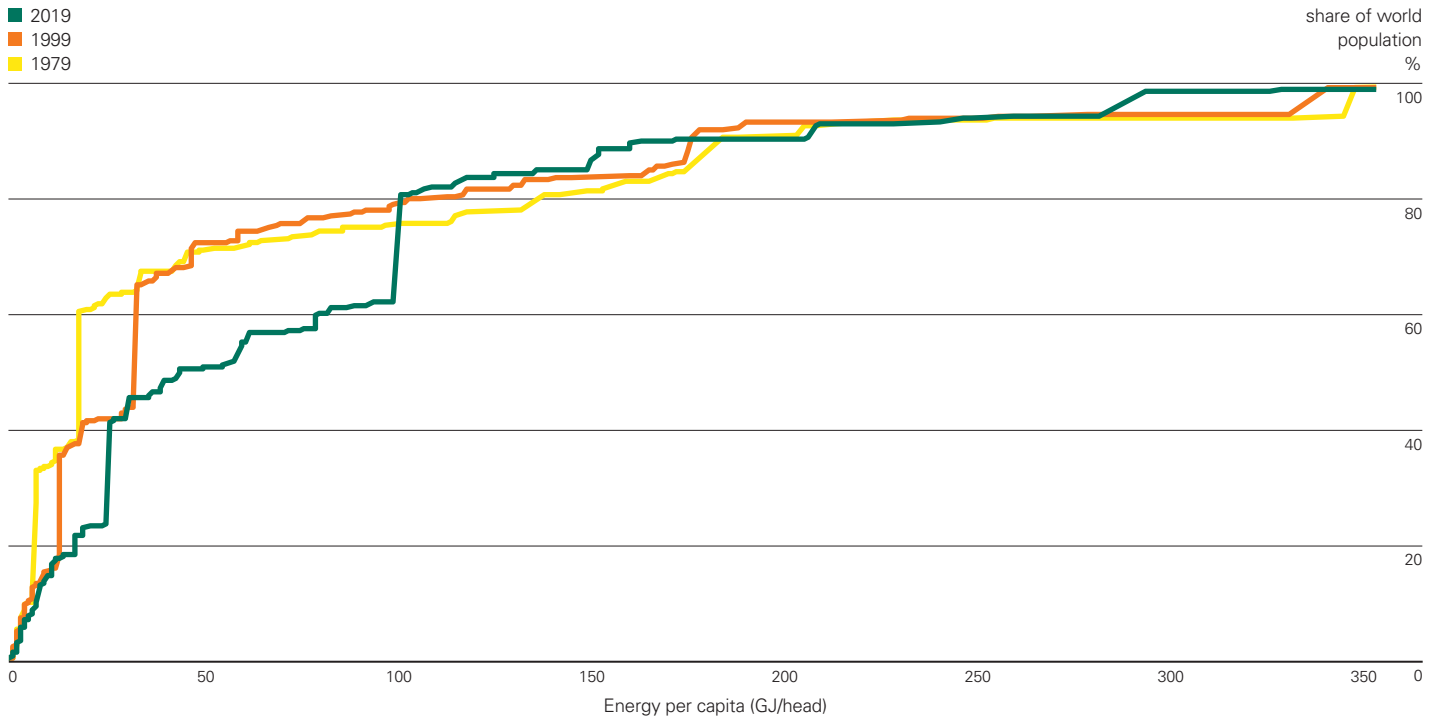
Gigajoules per head

■ North America ■ S. & Cent. America ■ Europe ■ CIS
■ Middle East ■ Africa ■ Asia Pacific ■ World



Average global energy consumption per capita increased by only 0.2% in 2019 to 75.7 GJ/head, driven by growth in the Middle East (1.4%) and Asia Pacific (2.4%). Energy demand per head fell in all other regions. North America is the region with the highest consumption per capita (236 GJ/head), followed by CIS (158 GJ/head) and the Middle East (151 GJ/head). Africa remains the region with the lowest average consumption (15 GJ/head).

Energy per capita: Distribution across countries



In 2019 81% of the global population lived in countries where average energy demand per capita was less than 100 GJ/head, two percentage points more than 20 years ago. However, the share of the global population consuming less than 75 GJ/head declined from 76% in 1999 to 57% last year. Average energy demand per capita in China increased from 17 GJ/head in 1979 to 99 GJ/head in 2019.

Total proved reserves

	At end 1999 Thousand million barrels	At end 2009 Thousand million barrels	At end 2018 Thousand million barrels	At end 2019			
				Thousand million barrels	Thousand million tonnes	Share of total	R/P ratio
Canada	181.6	175.0	170.8	169.7	27.3	9.8%	82.3
Mexico	21.5	11.9	5.8	5.8	0.8	0.3%	8.3
US	29.7	30.9	68.9	68.9	8.2	4.0%	11.1
Total North America	232.8	217.8	245.5	244.4	36.3	14.1%	27.2
Argentina	3.1	2.5	2.4	2.4	0.3	0.1%	10.5
Brazil	8.2	12.9	13.4	12.7	1.8	0.7%	12.1
Colombia	2.3	1.4	1.8	2.0	0.3	0.1%	6.1
Ecuador	2.6	2.7	1.6	1.6	0.2	0.1%	8.4
Peru	0.9	1.1	0.9	0.9	0.1	♦	16.5
Trinidad & Tobago	0.8	0.8	0.2	0.2	†	♦	8.1
Venezuela	76.8	211.2	303.8	303.8	48.0	17.5%	*
Other S. & Cent. America	1.3	0.8	0.5	0.5	0.1	♦	12.7
Total S. & Cent. America	95.9	233.3	324.7	324.1	50.9	18.7%	143.8
Denmark	0.9	0.9	0.4	0.4	0.1	♦	11.7
Italy	0.6	0.5	0.6	0.6	0.1	♦	17.0
Norway	10.9	7.1	8.6	8.5	1.1	0.5%	13.5
Romania	1.2	0.6	0.6	0.6	0.1	♦	22.0
United Kingdom	5.0	2.8	2.7	2.7	0.4	0.2%	6.6
Other Europe	2.0	2.0	1.6	1.6	0.2	0.1%	15.0
Total Europe	20.7	14.0	14.6	14.4	1.9	0.8%	11.6
Azerbaijan	1.2	7.0	7.0	7.0	1.0	0.4%	24.6
Kazakhstan	5.4	30.0	30.0	30.0	3.9	1.7%	42.6
Russian Federation	112.1	105.6	107.2	107.2	14.7	6.2%	25.5
Turkmenistan	0.5	0.6	0.6	0.6	0.1	♦	6.2
Uzbekistan	0.6	0.6	0.6	0.6	0.1	♦	26.3
Other CIS	0.3	0.3	0.3	0.3	†	♦	17.6
Total CIS	120.1	144.0	145.7	145.7	19.8	8.4%	27.3
Iran	93.1	137.0	155.6	155.6	21.4	9.0%	120.6
Iraq	112.5	115.0	145.0	145.0	19.6	8.4%	83.1
Kuwait	96.5	101.5	101.5	101.5	14.0	5.9%	92.8
Oman	5.7	5.5	5.4	5.4	0.7	0.3%	15.2
Qatar	13.1	25.9	25.2	25.2	2.6	1.5%	36.7
Saudi Arabia	262.8	264.6	297.7	297.6	40.9	17.2%	68.9
Syria	2.3	2.5	2.5	2.5	0.3	0.1%	291.2
United Arab Emirates	97.8	97.8	97.8	97.8	13.0	5.6%	67.0
Yemen	1.9	3.0	3.0	3.0	0.4	0.2%	84.2
Other Middle East	0.2	0.3	0.2	0.2	†	♦	2.6
Total Middle East	685.8	753.1	833.9	833.8	112.9	48.1%	75.3
Algeria	11.3	12.2	12.2	12.2	1.5	0.7%	22.5
Angola	5.1	9.5	8.2	8.2	1.1	0.5%	15.8
Chad	-	1.5	1.5	1.5	0.2	0.1%	32.4
Republic of Congo	1.7	2.0	3.0	3.0	0.4	0.2%	24.1
Egypt	3.8	4.4	3.1	3.1	0.4	0.2%	12.3
Equatorial Guinea	0.6	1.7	1.1	1.1	0.1	0.1%	16.7
Gabon	2.6	2.0	2.0	2.0	0.3	0.1%	25.1
Libya	29.5	46.4	48.4	48.4	6.3	2.8%	107.9
Nigeria	29.0	37.2	37.0	37.0	5.0	2.1%	48.0
South Sudan	n/a	n/a	3.5	3.5	0.5	0.2%	69.1
Sudan	0.3	5.0	1.5	1.5	0.2	0.1%	40.2
Tunisia	0.3	0.4	0.4	0.4	0.1	♦	23.2
Other Africa	0.7	0.6	3.9	3.9	0.5	0.2%	33.8
Total Africa	84.7	123.0	125.7	125.7	16.6	7.2%	41.0
Australia	4.7	4.1	2.4	2.4	0.3	0.1%	13.4
Brunei	1.3	1.1	1.1	1.1	0.1	0.1%	24.8
China	15.1	21.6	26.2	26.2	3.6	1.5%	18.7
India	5.0	5.8	4.5	4.7	0.6	0.3%	15.5
Indonesia	5.2	4.3	3.2	2.5	0.3	0.1%	8.7
Malaysia	2.1	3.6	2.8	2.8	0.4	0.2%	11.9
Thailand	0.4	0.4	0.3	0.3	†	♦	1.7
Vietnam	1.8	4.5	4.4	4.4	0.6	0.3%	51.0
Other Asia Pacific	1.4	1.1	1.2	1.4	0.2	0.1%	16.3
Total Asia Pacific	37.0	46.6	46.0	45.7	6.1	2.6%	16.4
Total World	1277.1	1531.8	1735.9	1733.9	244.6	100.0%	49.9
of which: OECD	256.4	234.7	261.3	260.1	38.3	15.0%	25.1
Non-OECD	1020.7	1297.1	1474.6	1473.7	206.3	85.0%	60.4
OPEC	821.8	1040.8	1214.8	1214.7	171.8	70.1%	93.6
Non-OPEC	455.3	491.0	521.1	519.2	72.8	29.9%	23.9
European Union	8.8	6.0	5.1	5.0	0.7	0.3%	9.0
Canadian oil sands: Total	175.2	169.8	163.5	162.4	26.4	9.4%	
of which: Under active development	11.9	26.5	21.2	20.1	3.3	1.2%	
Venezuela: Orinoco Belt	-	133.4	261.8	261.8	42.0	15.1%	

†Less than 0.05.

*Less than 0.05%.

n/a not available.

*More than 500 years.

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 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.

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 Chinese reserves based on official data and 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 and R/P ratio for Canada includes Canadian oil sands. Reserves and R/P ratio for Venezuela includes the Orinoco Belt. Saudi Arabia's oil reserves include NGLs from 2017.

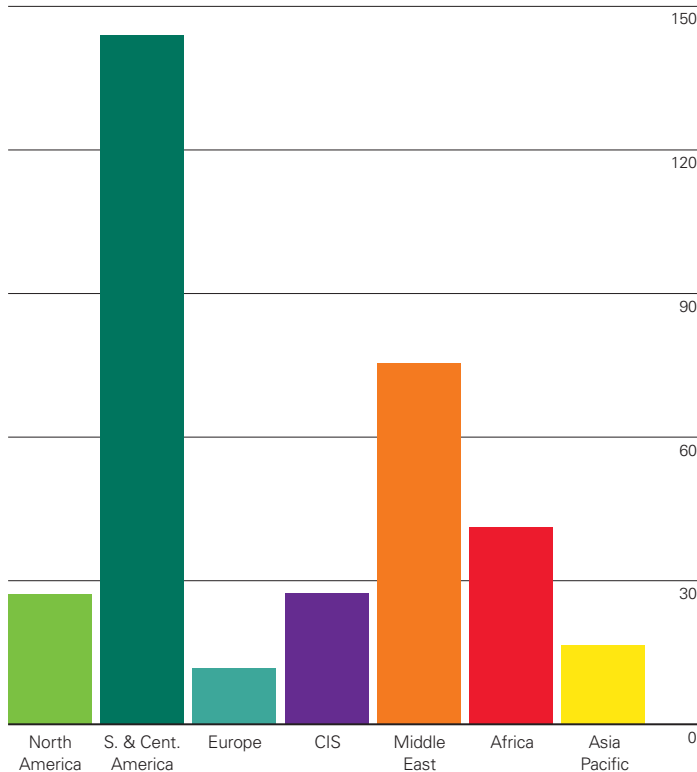
Reserves include gas condensate and natural gas liquids (NGLs) as well as crude oil.

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

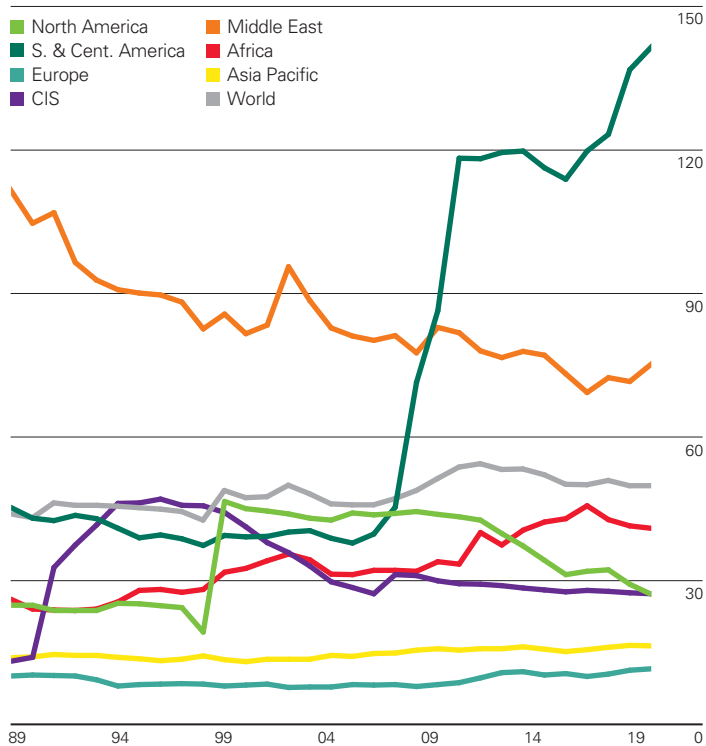
Reserves-to-production (R/P) ratios

Years

2019 by region



History

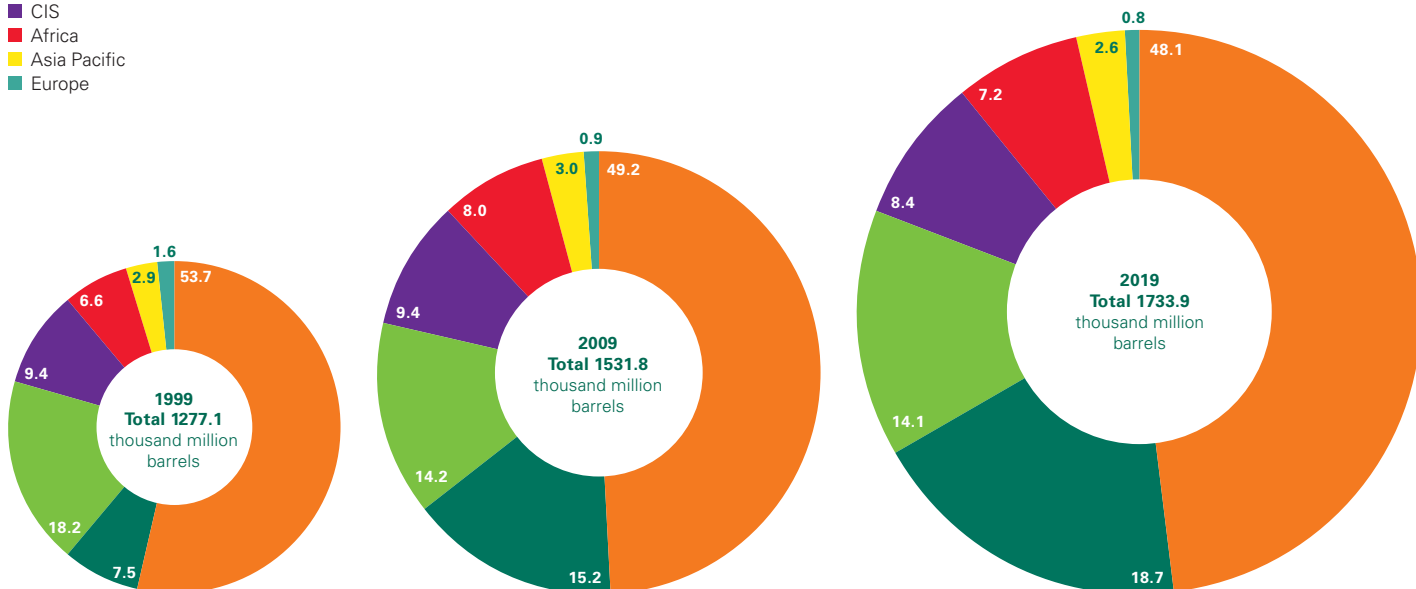


Global proved oil reserves were 1734 billion barrels at the end of 2019, down 2 billion barrels versus 2018. The global R/P ratio shows that oil reserves in 2019 accounted for 50 years of current production. Regionally, South & Central America has the highest R/P ratio (144 years) while Europe has the lowest (12 years). OPEC holds 70.1% of global reserves. The top countries in terms of reserves are Venezuela (17.5% of global reserves), closely followed by Saudi Arabia (17.2%) and Canada (9.8%).

Distribution of proved reserves in 1999, 2009 and 2019

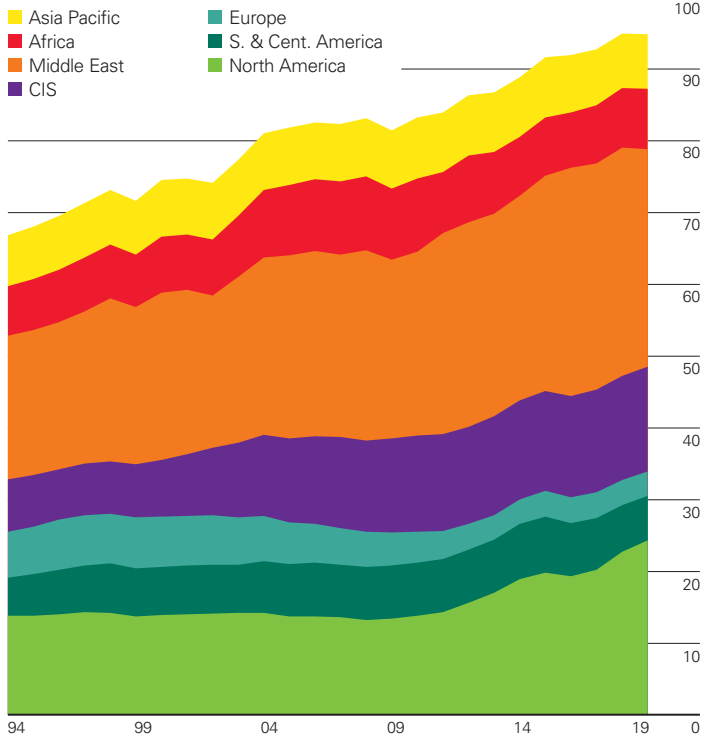
Percentage

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



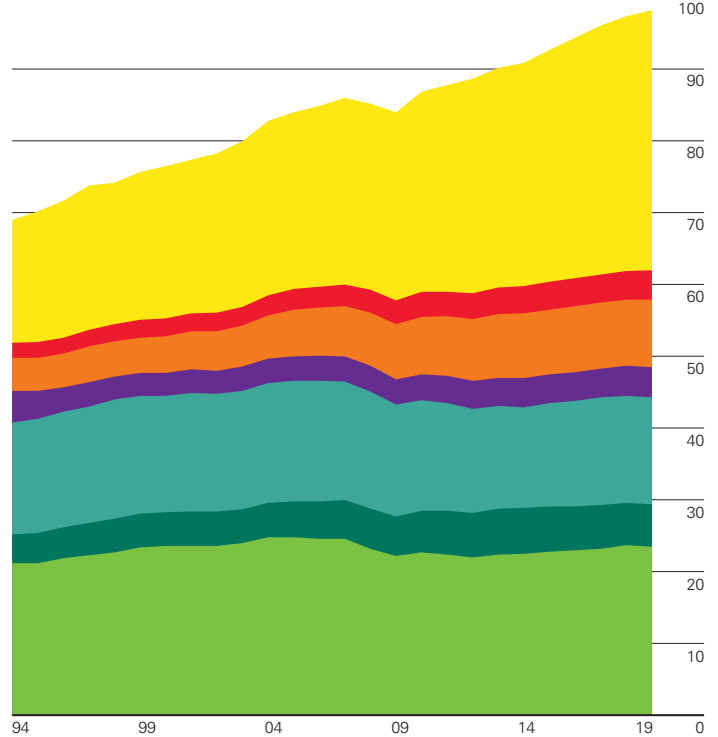
Oil: Production by region

Million barrels daily



Oil: Consumption by region

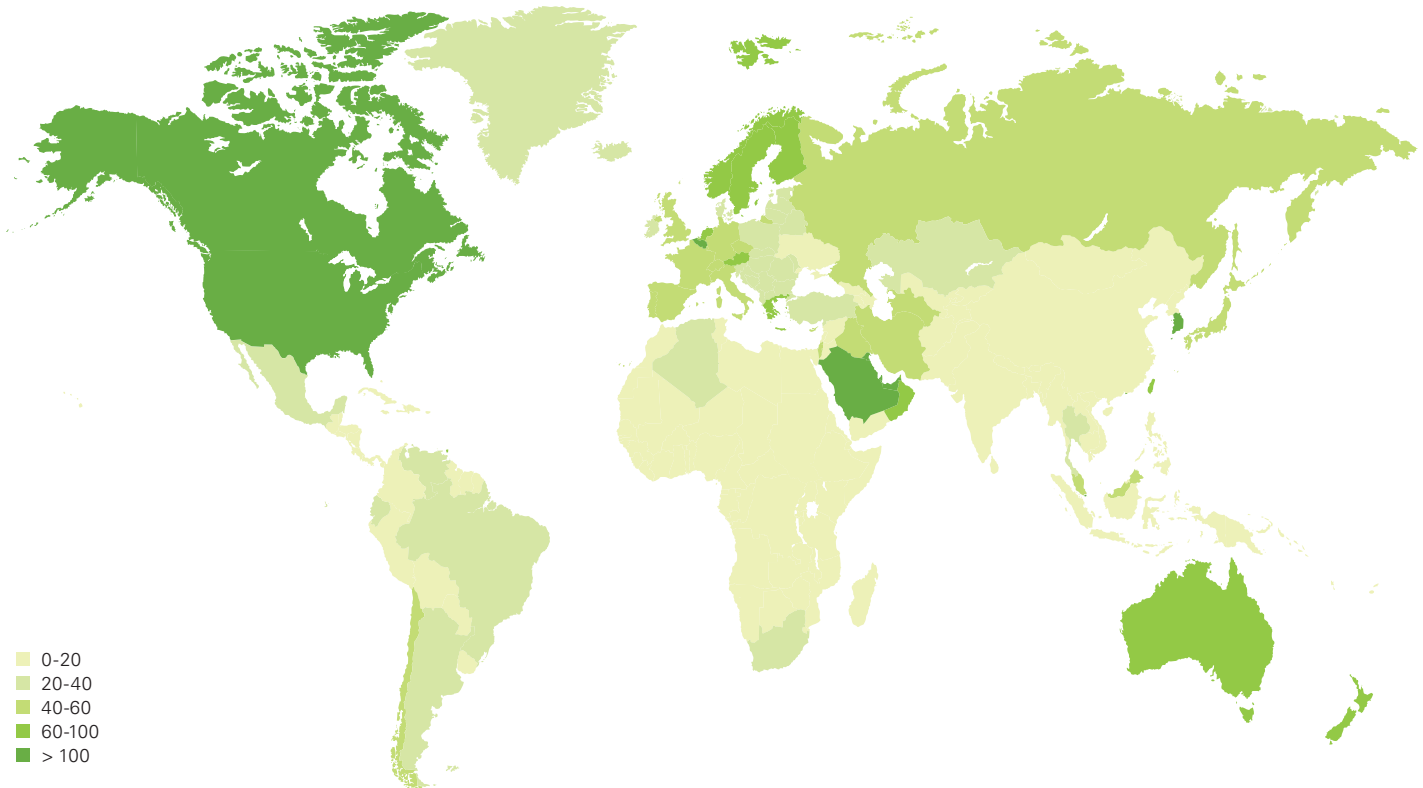
Million barrels daily



World oil production fell by 60,000 b/d in 2019 as strong growth in US output (1.7 million b/d) was more than offset by a decline in OPEC production (-2 million b/d), with sharp declines in Iran (-1.3 million b/d) Venezuela (-560,000 b/d) and Saudi Arabia (-430,000 b/d). Oil consumption grew by a below-average 0.9 million barrels per day (b/d), or 0.9%. Growth was led by China (680,000 b/d) and other emerging economies, while demand fell in the OECD (-290,000 b/d).

Oil: Consumption per capita 2019

GJ per capita



- 0-20
- 20-40
- 40-60
- 60-100
- > 100

Spot crude prices

US dollars per barrel	Dubai \$/bbl*	Brent \$/bbl†	Nigerian Forcados \$/bbl	West Texas Intermediate \$/bbl‡
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	15.05
1987	16.95	18.44	18.39	19.19
1988	13.18	14.92	15.00	15.98
1989	15.65	18.23	18.30	19.67
1990	20.26	23.73	23.85	24.46
1991	16.63	20.00	20.11	21.53
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	31.06
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	66.04
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
2017	53.13	54.19	54.31	50.79
2018	69.51	71.31	72.47	65.20
2019	63.43	64.21	64.95	57.03

*1984-1985 Arabian Light, 1986-2019 Dubai dated.

†1984-2019 Brent dated.

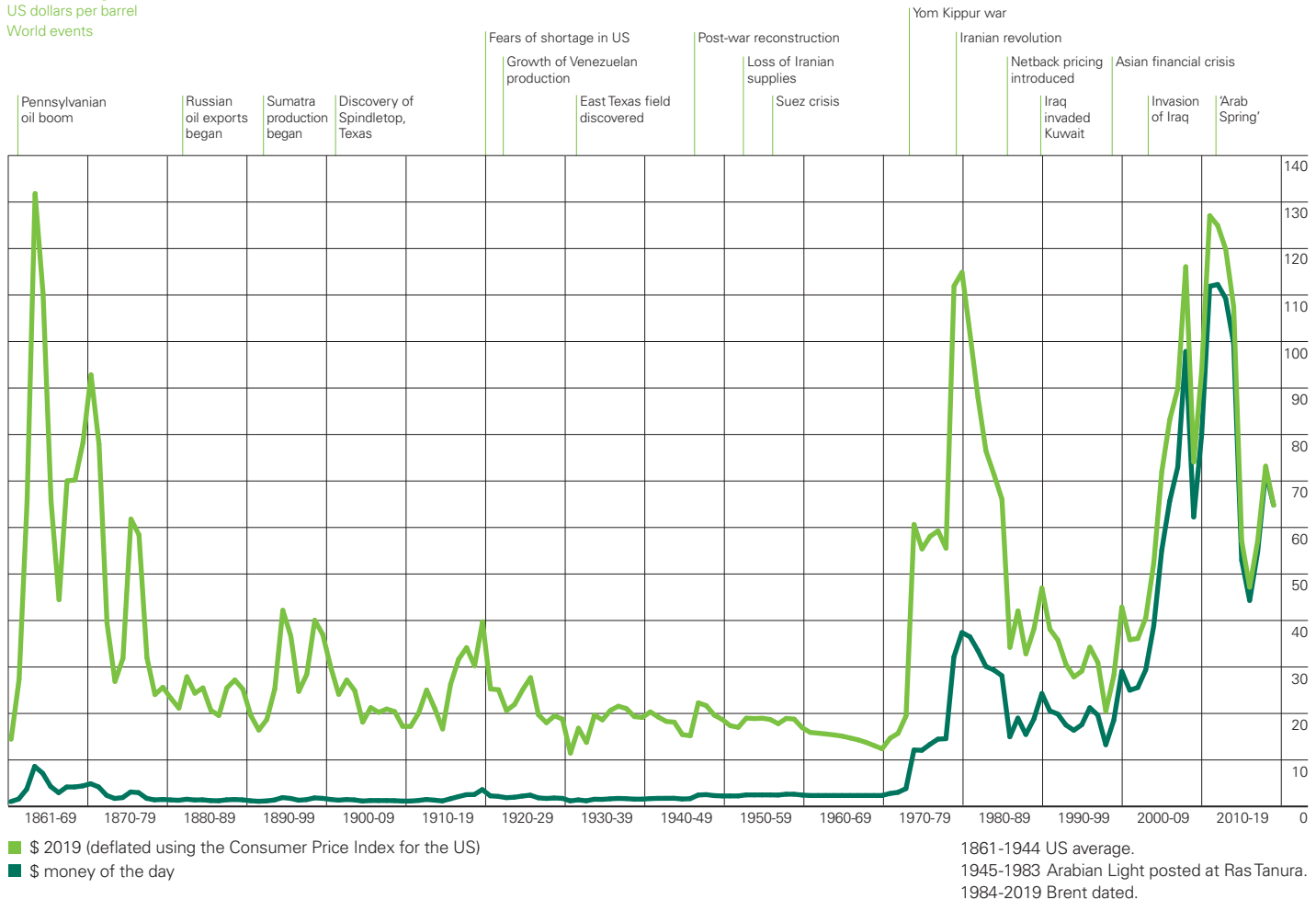
‡1984-2019 Spot WTI (Cushing) prices.

Source: S&P Global Platts, © 2020, S&P Global Inc.

Crude oil prices 1861-2019

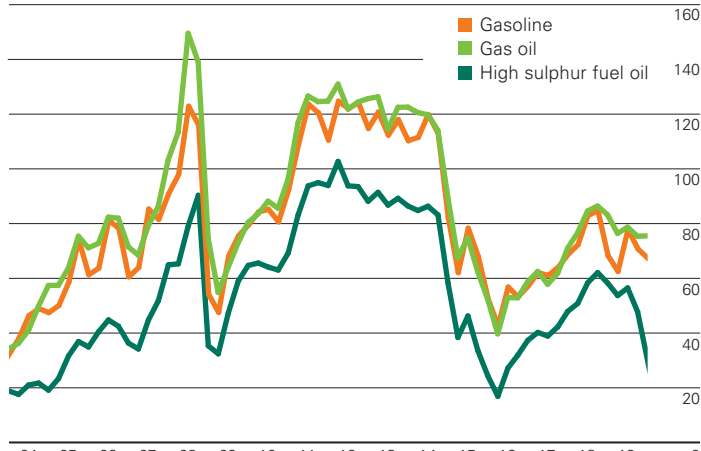
US dollars per barrel

World events



Oil product prices (Rotterdam)

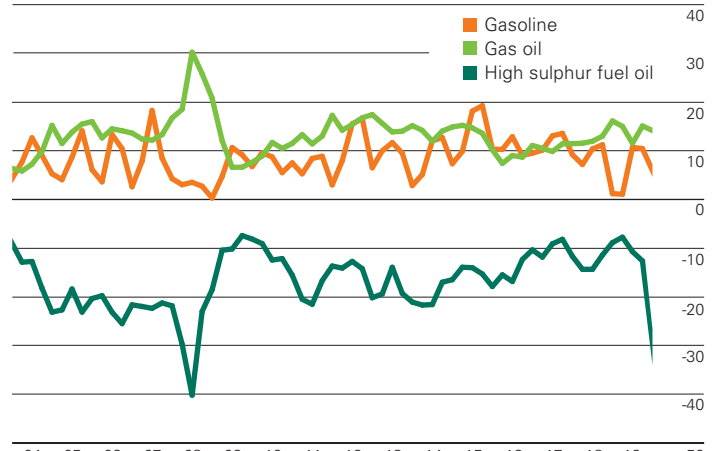
US dollars per barrel



Source: S&P Global Platts, © 2020, S&P Global Inc.

Product differentials to crude (Rotterdam products minus Dated Brent)

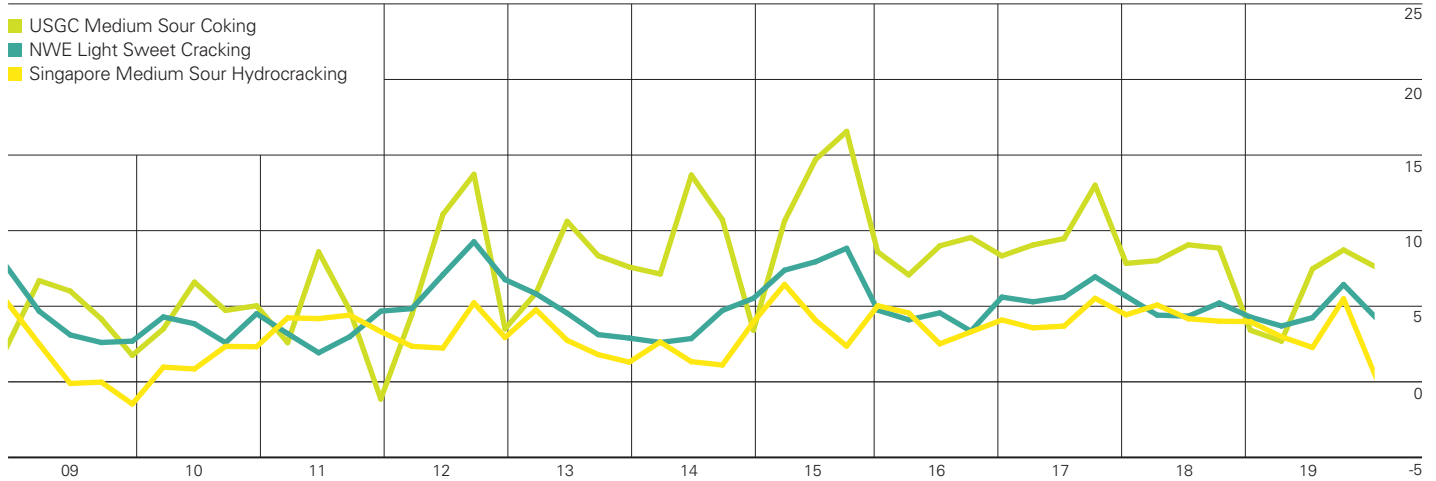
US dollars per barrel



Source: S&P Global Platts, © 2020, S&P Global Inc.

Regional refining margins

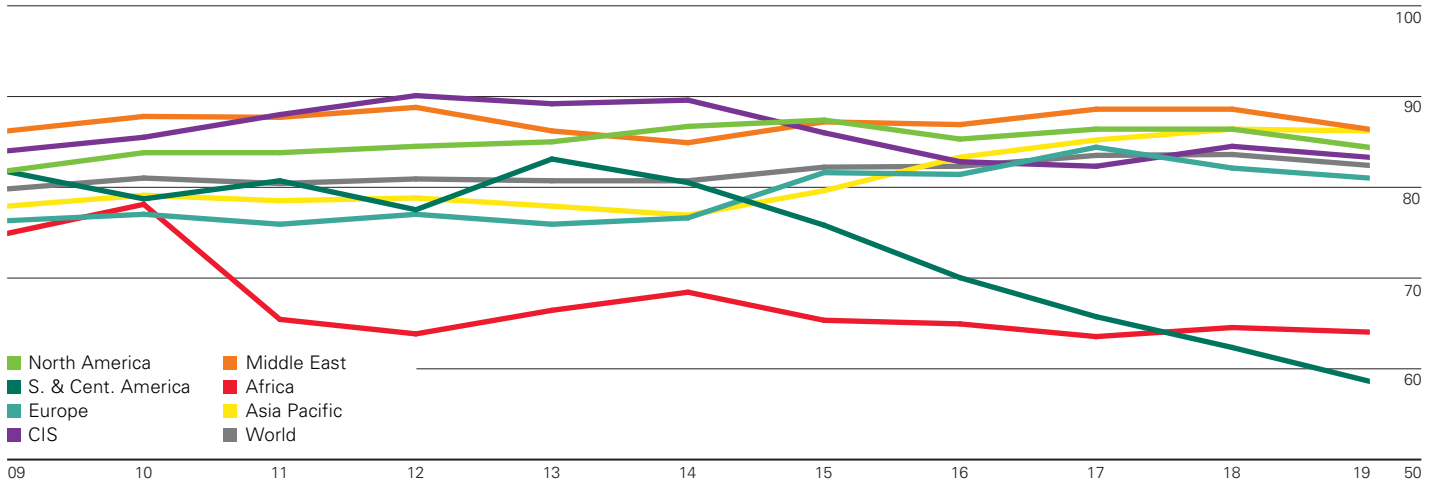
US dollars per barrel



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

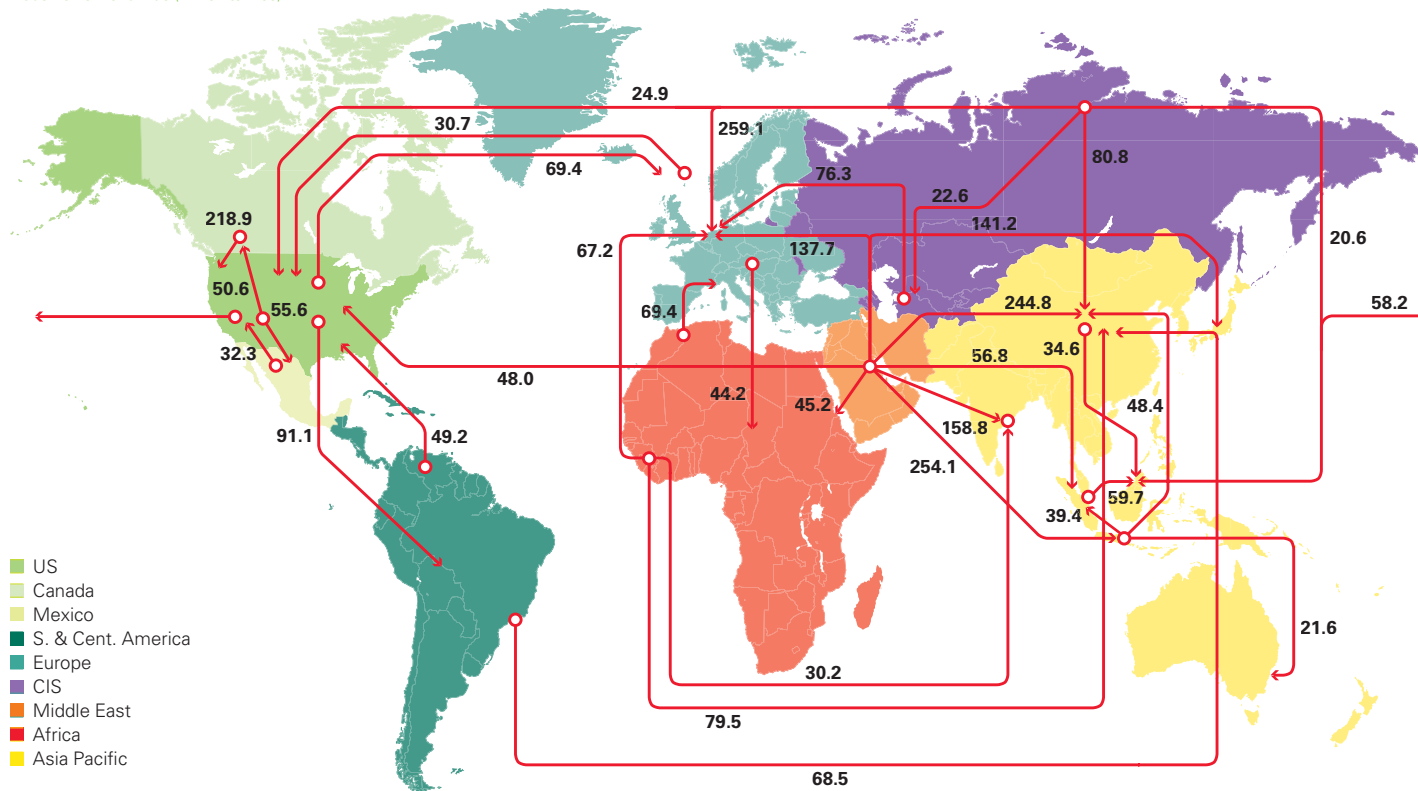
Percentage (based on average annual capacity)



Global refinery throughput grew by only 30,000 b/d in 2019, held back by weak demand and robust growth in NGLs supplies. China's crude runs rose by a record 950,000 b/d, but throughput declined in most other regions, particularly the US (-400,000 b/d) and South & Central America (-300,000 b/d). Refining capacity rose by 1.5 million b/d, the largest increase since 2009 aided by a record low level of refinery closures. As a result, global refinery utilization fell sharply by 1.2 percentage points to 82.5%, the largest annual decline since 2009. Utilization in S&C America fell to an all-time low of 58.7%.

Major trade movements 2019

Trade flows worldwide (million tonnes)



Oil trade in 2018 and 2019

Million tonnes	2018				2019			
	Crude imports	Product imports	Crude exports	Product exports	Crude imports	Product imports	Crude exports	Product exports
Canada	26.6	35.7	191.5	32.0	32.9	32.5	197.0	34.7
Mexico	0.1	61.6	59.8	5.4	0.1	60.9	58.1	4.8
US	386.8	104.0	92.2	248.9	338.4	109.9	137.7	251.1
S. & Cent. America	24.4	105.9	156.9	28.2	21.3	110.2	146.2	23.3
Europe	514.4	218.4	25.7	138.9	522.5	209.2	26.7	125.4
Russia	0.5	9.4	274.7	170.4	†	9.4	286.1	164.6
Other CIS	18.6	10.0	86.8	21.9	18.5	5.6	91.5	20.4
Iraq	†	3.4	201.1	8.6	†	4.5	200.8	11.0
Kuwait	†	0.7	107.4	25.1	†	0.8	99.2	25.4
Saudi Arabia	†	10.9	367.1	60.6	0.1	11.4	358.4	57.4
United Arab Emirates	7.3	32.4	126.5	75.1	12.3	34.9	139.4	77.0
Other Middle East	24.9	16.7	191.3	59.6	27.8	17.8	125.2	62.1
North Africa	7.3	38.9	92.3	26.6	6.4	37.6	93.4	26.1
West Africa	1.0	41.7	218.9	7.5	0.4	38.5	219.0	7.7
East & S. Africa	21.5	34.4	6.3	3.0	19.6	39.0	5.5	3.0
Australasia	23.4	32.6	9.0	4.0	22.9	32.2	13.0	5.5
China	463.8	81.8	2.4	54.7	507.2	78.4	0.4	66.9
India	226.1	31.3	0.1	58.2	221.7	44.4	0.1	60.7
Japan	150.7	43.7	†	18.0	146.9	39.7	†	19.3
Singapore	51.8	120.4	0.6	88.9	49.6	112.4	1.9	86.1
Other Asia Pacific	300.0	209.0	38.9	107.2	290.4	212.7	39.2	109.3
Total World	2249.3	1242.9	2249.3	1242.9	2239.0	1241.9	2239.0	1241.9
Thousand barrels daily								
Canada	534	747	3845	668	660	679	3956	726
Mexico	3	1287	1200	114	1	1273	1167	101
US	7768	2175	1851	5203	6796	2298	2766	5250
S. & Cent. America	490	2215	3150	590	427	2303	2936	486
Europe	10330	4566	516	2904	10494	4373	537	2622
Russia	10	196	5517	3563	†	197	5746	3440
Other CIS	373	210	1743	458	372	117	1838	427
Iraq	†	71	4039	181	†	94	4032	230
Kuwait	†	15	2156	524	†	17	1992	531
Saudi Arabia	†	228	7372	1266	1	238	7198	1199
United Arab Emirates	147	677	2540	1569	248	729	2800	1610
Other Middle East	501	348	3842	1246	558	372	2514	1299
North Africa	147	812	1853	557	129	785	1875	545
West Africa	19	873	4395	157	9	806	4399	161
East & S. Africa	432	719	127	62	393	815	110	62
Australasia	469	681	182	84	459	672	262	115
China	9314	1711	48	1144	10186	1639	9	1398
India	4541	655	1	1218	4451	928	1	1268
Japan	3027	913	†	376	2950	830	†	404
Singapore	1040	2516	12	1858	997	2350	38	1799
Other Asia Pacific	6025	4368	781	2241	5833	4446	788	2286
Total World	45172	25982	45172	25982	44964	25961	44964	25961

†Less than 0.05.

‡Less than 0.5.

Notes: Does not include biofuels trade. Bunker fuel use is not included as exports. Intra-area movements (for example, between countries within Europe) are excluded. Crude imports and exports include condensates.

Total proved reserves

	At end 1999 Trillion cubic metres	At end 2009 Trillion cubic metres	At end 2018 Trillion cubic metres	At end 2019			
				Trillion cubic metres	Trillion cubic feet	Share of total	R/P ratio
Canada	1.6	1.6	1.9	2.0	70.1	1.0%	11.5
Mexico	0.9	0.3	0.2	0.2	6.3	0.1%	5.3
US	4.5	7.4	12.9	12.9	454.6	6.5%	14.0
Total North America	7.0	9.4	15.0	15.0	531.0	7.6%	13.3
Argentina	0.7	0.4	0.4	0.4	12.7	0.2%	8.7
Bolivia	0.1	0.3	0.2	0.2	7.5	0.1%	14.2
Brazil	0.2	0.4	0.4	0.4	13.3	0.2%	14.5
Colombia	0.2	0.1	0.1	0.1	3.6	0.1%	7.8
Peru	0.2	0.3	0.3	0.3	10.2	0.1%	21.4
Trinidad & Tobago	0.6	0.4	0.3	0.3	10.2	0.1%	8.4
Venezuela	4.6	5.6	6.3	6.3	222.4	3.2%	238.0
Other S. & Cent. America	0.1	0.1	0.1	0.1	2.2	♦	17.5
Total S. & Cent. America	6.8	7.6	8.0	8.0	282.1	4.0%	46.0
Denmark	0.1	0.1	†	†	†	♦	0.0
Germany	0.2	0.1	†	†	0.8	♦	4.1
Italy	0.2	0.1	†	†	1.5	♦	9.4
Netherlands	1.6	1.2	0.2	0.2	6.1	0.1%	6.2
Norway	1.2	2.0	1.6	1.5	54.1	0.8%	13.4
Poland	0.1	0.1	0.1	0.1	2.6	♦	18.1
Romania	0.3	0.6	0.1	0.1	3.6	0.1%	10.6
Ukraine	0.8	0.7	1.1	1.1	38.5	0.5%	55.7
United Kingdom	0.8	0.3	0.2	0.2	6.6	0.1%	4.7
Other Europe	0.2	0.2	0.1	0.1	4.8	0.1%	18.4
Total Europe	5.6	5.3	3.4	3.4	118.7	1.7%	14.2
Azerbaijan	1.0	1.0	2.1	2.8	100.5	1.4%	117.0
Kazakhstan	2.0	2.0	2.7	2.7	93.7	1.3%	113.4
Russian Federation	32.9	34.0	38.0	38.0	1340.5	19.1%	55.9
Turkmenistan	2.6	8.2	19.5	19.5	688.1	9.8%	308.5
Uzbekistan	1.2	1.3	1.2	1.2	42.7	0.6%	21.5
Other CIS	†	†	†	†	1.2	♦	110.9
Total CIS	39.8	46.6	63.6	64.2	2266.8	32.3%	75.8
Bahrain	0.3	0.2	0.2	0.1	2.7	♦	4.6
Iran	23.6	28.0	32.0	32.0	1130.7	16.1%	131.1
Iraq	3.1	3.0	3.5	3.5	125.1	1.8%	328.7
Israel	†	0.1	0.4	0.5	16.4	0.2%	46.2
Kuwait	1.4	1.7	1.7	1.7	59.9	0.9%	92.1
Oman	0.8	0.5	0.7	0.7	23.5	0.3%	18.3
Qatar	11.5	26.2	24.7	24.7	871.6	12.4%	138.6
Saudi Arabia	5.8	7.4	5.9	6.0	211.3	3.0%	52.7
Syria	0.2	0.3	0.3	0.3	9.5	0.1%	72.1
United Arab Emirates	5.8	5.9	5.9	5.9	209.7	3.0%	95.0
Yemen	0.3	0.3	0.3	0.3	9.4	0.1%	458.2
Other Middle East	†	†	†	†	0.2	♦	47.1
Total Middle East	53.0	73.6	75.6	75.6	2670.0	38.0%	108.7
Algeria	4.4	4.3	4.3	4.3	153.1	2.2%	50.3
Egypt	1.2	2.1	2.1	2.1	75.5	1.1%	32.9
Libya	1.2	1.5	1.4	1.4	50.5	0.7%	151.5
Nigeria	3.3	5.0	5.4	5.4	190.4	2.7%	109.4
Other Africa	0.8	1.2	1.4	1.6	57.5	0.8%	58.1
Total Africa	11.0	14.2	14.7	14.9	527.0	7.5%	62.7
Australia	1.6	2.8	2.4	2.4	84.4	1.2%	15.6
Bangladesh	0.3	0.4	0.1	0.1	4.3	0.1%	4.2
Brunei	0.4	0.3	0.2	0.2	8.3	0.1%	18.0
China	1.4	2.9	6.4	8.4	296.6	4.2%	47.3
India	0.6	1.1	1.3	1.3	46.9	0.7%	49.4
Indonesia	2.7	3.1	2.8	1.4	50.5	0.7%	21.2
Malaysia	1.1	1.1	0.9	0.9	33.4	0.5%	12.0
Myanmar	0.3	0.3	1.2	1.2	41.3	0.6%	68.4
Pakistan	0.4	0.6	0.4	0.4	14.2	0.2%	11.9
Papua New Guinea	†	0.1	0.2	0.2	6.2	0.1%	14.2
Thailand	0.4	0.3	0.2	0.2	6.3	0.1%	5.0
Vietnam	0.2	0.7	0.6	0.6	22.8	0.3%	65.6
Other Asia Pacific	0.3	0.3	0.2	0.2	8.4	0.1%	13.9
Total Asia Pacific	9.5	13.9	16.9	17.7	623.5	8.9%	26.3
Total World	132.8	170.5	197.1	198.8	7019.0	100.0%	49.8
of which: OECD	13.2	16.2	20.1	20.1	709.5	10.1%	13.3
Non-OECD	119.6	154.3	177.0	178.7	6309.5	89.9%	72.0
European Union	3.5	2.5	0.7	0.7	23.9	0.3%	6.7

†Less than 0.05.

♦Less than 0.05%.

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 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.

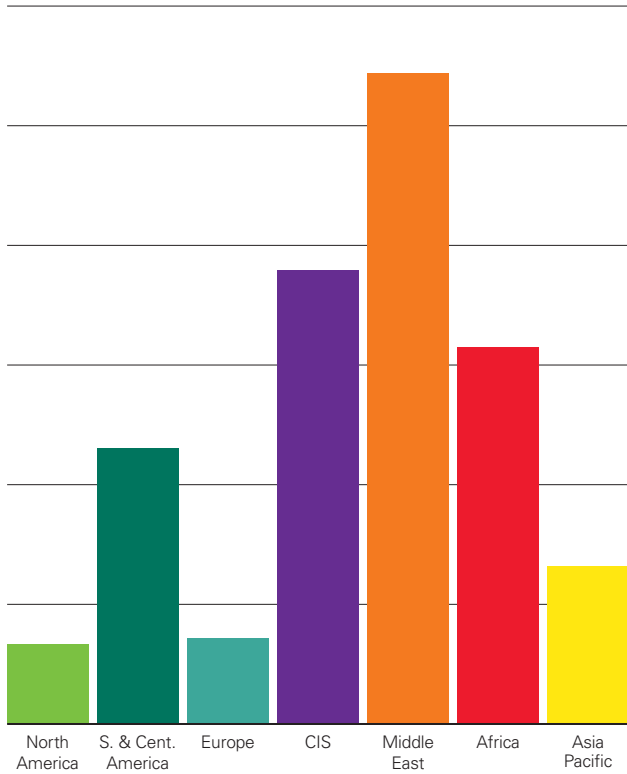
Source of data – the estimates in this table have been compiled using a combination of primary official sources and third-party data from Cedigaz and the OPEC Secretariat.

As far as possible, the data above represents standard cubic metres (measured at 15°C and 1013 mbar) and have been standardized using a gross calorific value (GCV) of 40 MJ/m³.

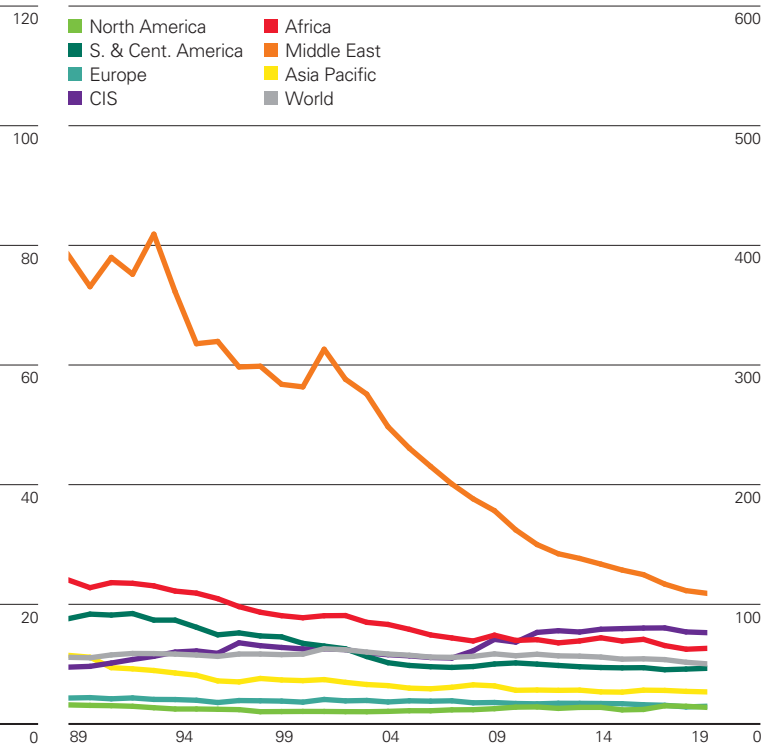
Reserves-to-production (R/P) ratios

Years

2019 by region



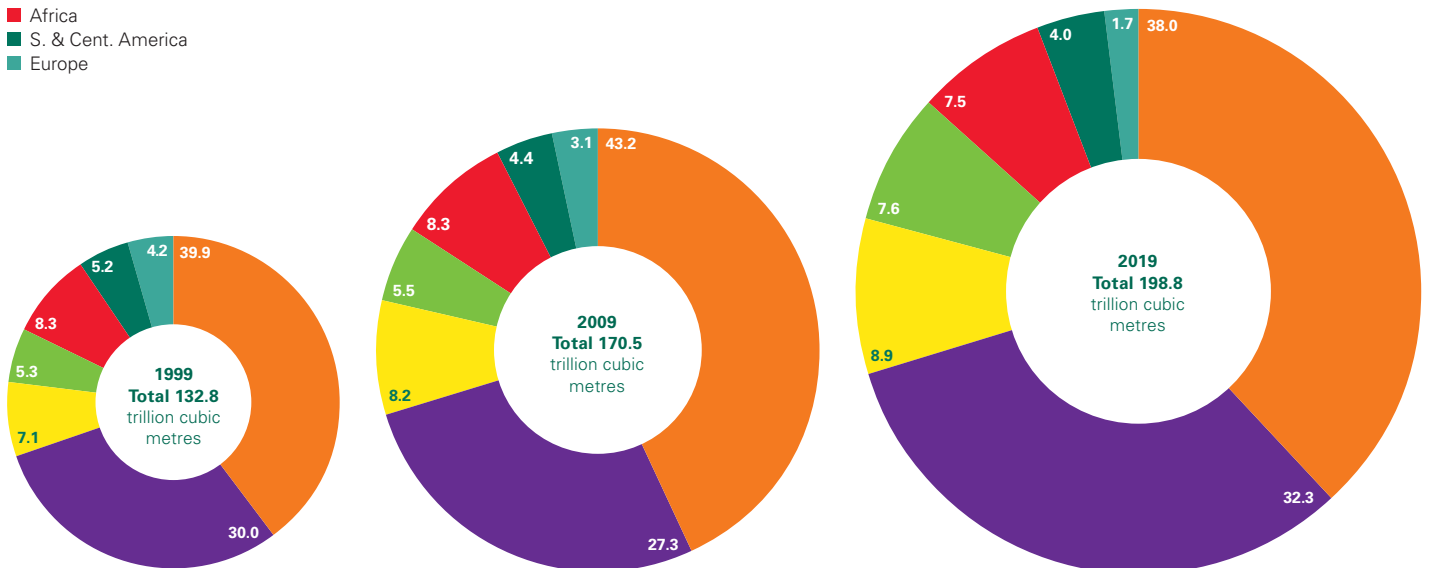
History



World proved gas reserves increased by 1.7 Tcm to 198.8 Tcm in 2019. China (2 Tcm) and Azerbaijan (0.7 Tcm) provided the largest increments, although this was partially offset by a 1.3 Tcm decline in Indonesian reserves. Russia (38 Tcm), Iran (32 Tcm) and Qatar (24.7 Tcm) are the countries with the largest reserves. The current global R/P ratio shows that gas reserves in 2019 accounted for 49.8 years of current production. The Middle East (108.7 years) and CIS (75.8 years) are the regions with the highest R/P ratio.

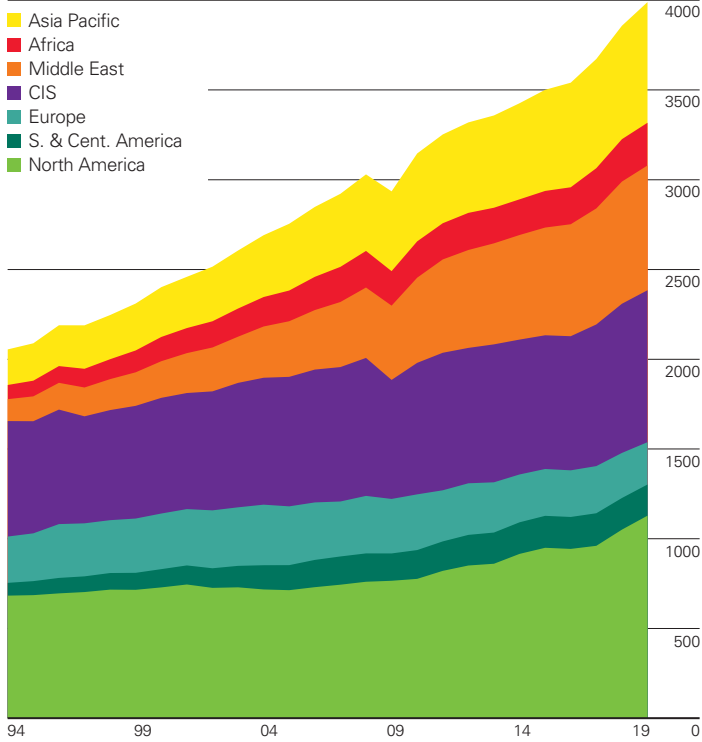
Distribution of proved reserves in 1999, 2009 and 2019

Percentage



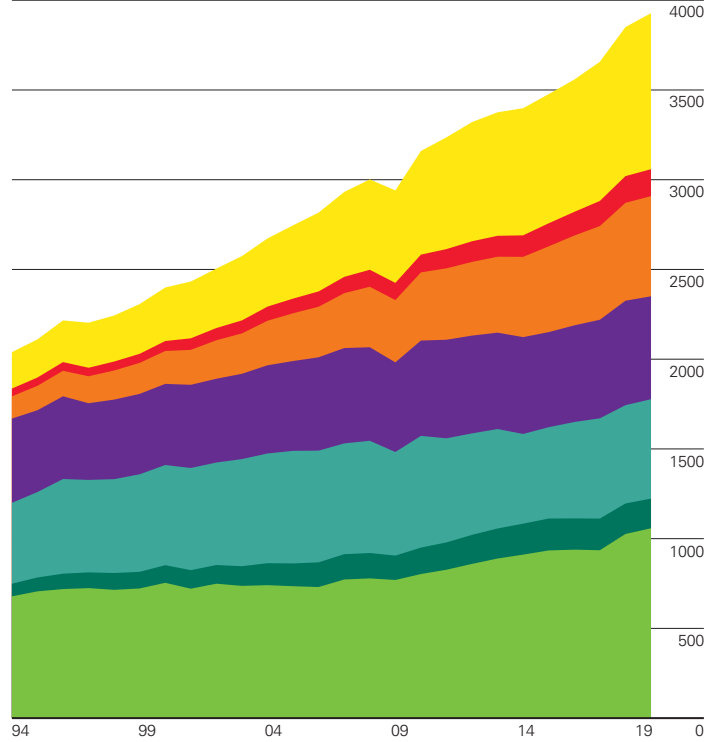
Natural gas: Production by region

Billion cubic metres



Natural gas: Consumption by region

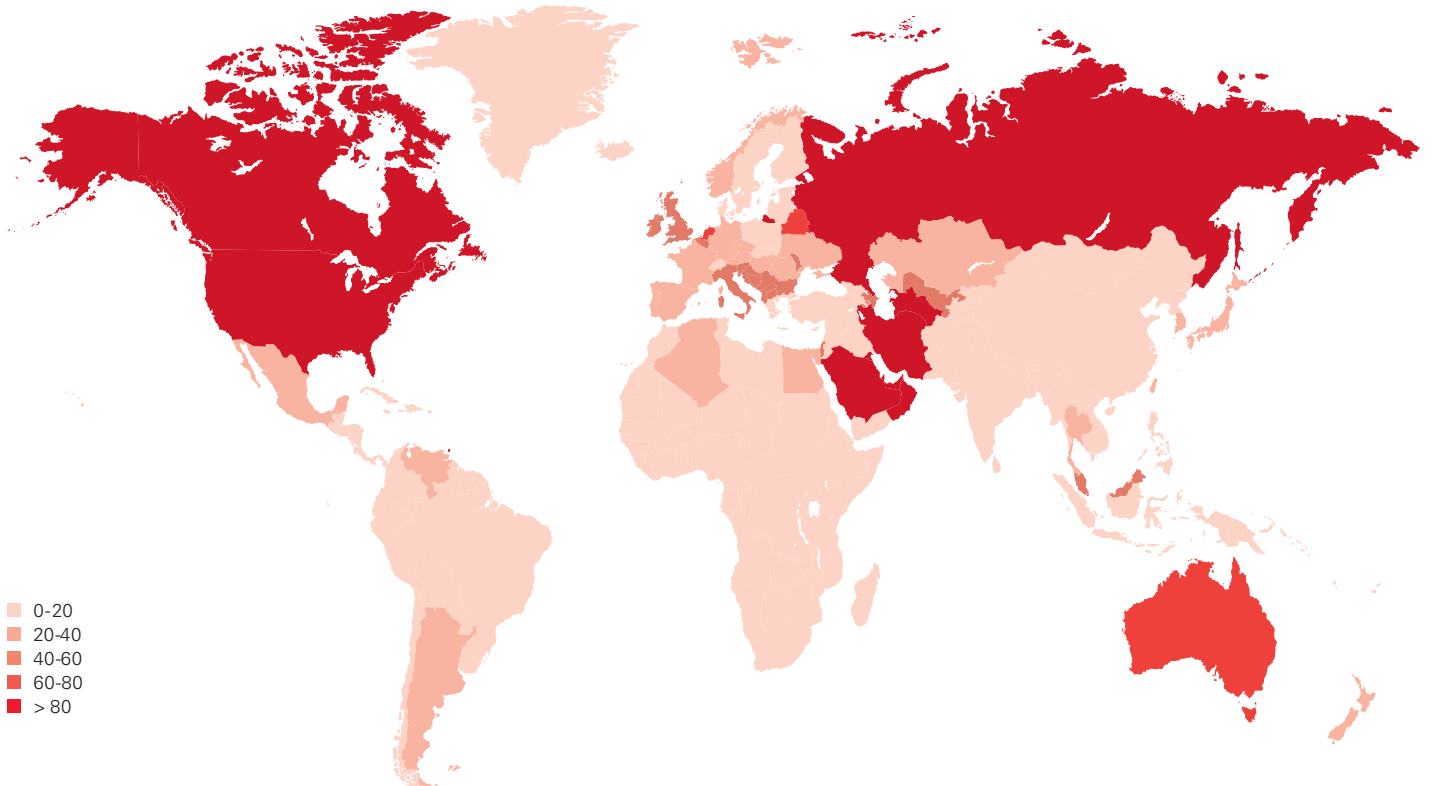
Billion cubic metres



Natural gas consumption increased by 78 billion cubic metres (bcm), or 2%, well below the strong growth seen in 2018 (5.3%). Growth was driven by the US (27 bcm) and China (24 bcm), while Russia and Japan saw the largest declines (10 and 8 bcm respectively). Gas production grew by 132 bcm (3.4%), with the US accounting for almost two-thirds of this increase (85 bcm). Australia (23 bcm) and China (16 bcm) were also key contributors to growth.

Natural gas: Consumption per capita 2019

GJ per capita



- 0-20
- 20-40
- 40-60
- 60-80
- > 80

Prices

US dollars per million Btu	LNG		Natural gas					Crude oil
	Japan CIF ¹	Japan Korea Marker (JKM) ²	Average German Import Price ³	UK (Heren NBP Index) ⁴	Netherlands TTF (DA Heren Index) ⁴	US Henry Hub ⁵	Canada (Alberta) ⁶	OECD countries CIF ⁶
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	6.07	8.79	7.25	8.74
2006	7.14	-	7.87	7.87	7.46	6.76	5.83	10.66
2007	7.73	-	7.99	6.01	5.93	6.95	6.17	11.95
2008	12.55	-	11.60	10.79	10.66	8.85	7.99	16.76
2009	9.06	5.28	8.53	4.85	4.96	3.89	3.38	10.41
2010	10.91	7.72	8.03	6.56	6.77	4.39	3.69	13.47
2011	14.73	14.02	10.49	9.04	9.26	4.01	3.47	18.55
2012	16.75	15.12	10.93	9.46	9.45	2.76	2.27	18.82
2013	16.17	16.56	10.73	10.64	9.75	3.71	2.93	18.25
2014	16.33	13.86	9.11	8.25	8.14	4.35	3.87	16.80
2015	10.31	7.45	6.72	6.53	6.44	2.60	2.01	8.77
2016	6.94	5.72	4.93	4.69	4.54	2.46	1.55	7.04
2017	8.10	7.13	5.62	5.80	5.72	2.96	1.60	8.97
2018	10.05	9.76	6.62	8.06	7.90	3.13	1.12	11.68
2019	9.94	5.49	5.25	4.47	4.45	2.53	1.27	10.82

¹Source: EDMC Energy Trend.

²Source: S&P Global Platts ©2020, S&P Global Inc.

³Source: 1986-1990 German Federal Statistical Office, 1991-2019 German Federal Office of Economics and Export Control (BAFA).

⁴Source: ICIS Heren Energy Ltd.

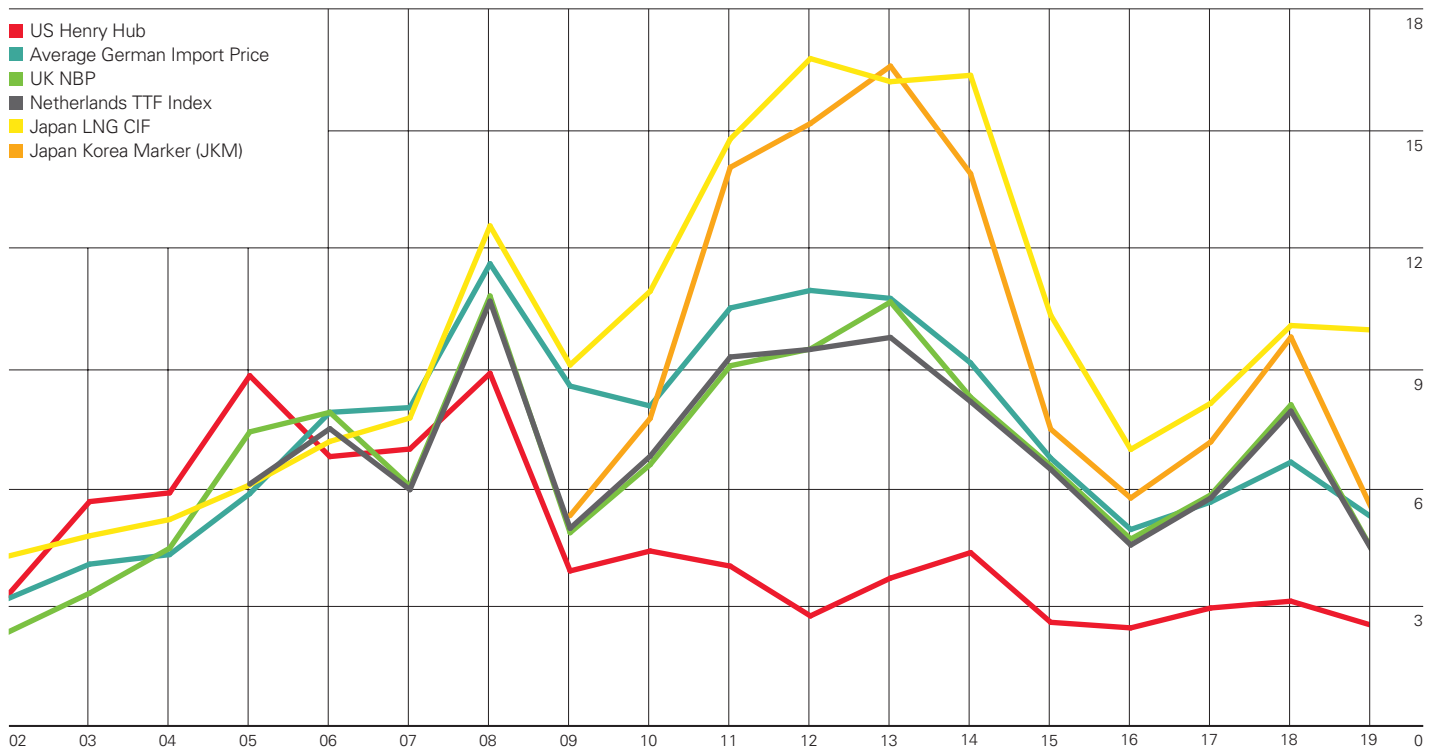
⁵Source: Energy Intelligence Group, *Natural Gas Week*.

⁶Source: ©OECD/IEA 2020, Oil, Gas, Coal and Electricity, Quarterly Statistics www.iea.org/statistics.

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

Prices

\$/mmBtu



Natural gas: LNG imports

Billion cubic metres	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Growth rate per annum		Share 2019
												2019	2008-18	
Canada	1.0	2.0	3.2	1.6	1.0	0.5	0.6	0.3	0.4	0.6	0.5	-13.2%	n/a	0.1%
Mexico	3.7	6.1	3.8	4.9	7.8	9.3	6.8	5.6	6.6	6.9	6.6	-4.4%	6.2%	1.4%
US	12.6	12.1	9.9	4.9	2.7	1.7	2.5	2.4	2.2	2.1	1.5	-30.9%	-14.2%	0.3%
Total North America	17.3	20.2	16.8	11.4	11.4	11.5	10.0	8.3	9.2	9.6	8.6	-10.8%	-3.4%	1.8%
Argentina	1.0	1.9	3.7	4.7	6.3	6.2	5.6	5.1	4.6	3.6	1.7	-51.9%	23.7%	0.4%
Brazil	0.4	2.8	0.7	3.5	5.2	7.1	6.8	2.6	1.7	2.9	3.2	12.2%	n/a	0.7%
Chile	0.7	3.1	3.7	4.0	3.8	3.5	3.7	4.5	4.4	4.3	3.3	-22.2%	n/a	0.7%
Other S. & Cent. America	1.4	1.4	1.9	2.4	2.8	2.8	2.8	3.0	2.8	3.7	4.8	29.5%	10.7%	1.0%
Total S. & Cent. America	3.5	9.2	9.9	14.6	18.1	19.6	18.9	15.2	13.5	14.5	13.1	-9.5%	23.4%	2.7%
Belgium	6.8	6.5	6.3	4.1	3.1	2.9	3.6	2.4	1.3	3.3	7.2	117.9%	0.9%	1.5%
France	13.3	14.7	14.4	9.8	8.3	6.9	6.4	9.1	10.9	12.7	22.9	79.8%	-0.1%	4.7%
Italy	3.0	9.3	9.1	7.1	5.8	4.5	5.9	5.9	8.2	8.2	13.5	64.2%	17.5%	2.8%
Spain	27.5	28.2	23.9	21.4	15.7	16.2	13.7	13.8	16.6	15.0	21.9	46.0%	-6.6%	4.5%
Turkey	6.0	7.8	5.9	7.6	5.9	7.1	7.5	7.6	10.9	11.4	12.9	12.4%	7.5%	2.7%
United Kingdom	10.1	18.8	24.7	13.9	9.2	11.2	13.7	10.7	6.6	7.2	18.0	151.9%	24.3%	3.7%
Other EU	3.7	3.9	4.9	4.4	3.7	3.3	5.2	6.9	10.2	13.4	23.4	74.7%	13.6%	4.8%
Rest of Europe	-	†	-	†	-	†	-	†	0.1	†	†	26.8%	n/a	♦
Total Europe	70.5	89.1	89.2	68.2	51.8	52.1	56.0	56.4	64.7	71.3	119.8	68.1%	2.2%	24.7%
Egypt	-	-	-	-	-	-	3.9	10.7	8.3	3.2	-	-100.0%	n/a	-
Kuwait	0.9	2.8	3.0	2.8	2.3	3.6	4.3	4.7	4.8	4.3	5.1	19.0%	n/a	1.1%
United Arab Emirates	-	0.2	1.4	1.4	1.6	1.6	2.9	4.2	3.0	1.0	1.6	55.0%	n/a	0.3%
Other Middle East & Africa	-	-	-	-	0.5	0.1	2.7	4.8	5.3	4.0	2.8	-30.9%	n/a	0.6%
Total Middle East & Africa	0.9	3.0	4.4	4.2	4.3	5.3	13.7	24.5	21.4	12.5	9.5	-24.1%	n/a	2.0%
China	8.0	13.0	16.9	20.1	25.1	27.3	27.0	36.8	52.9	73.5	84.8	15.4%	31.8%	17.5%
India	13.0	11.5	17.4	18.4	18.0	19.1	20.0	24.3	26.1	30.6	32.9	7.4%	10.5%	6.8%
Japan	88.9	96.4	108.6	119.8	120.4	121.8	115.9	113.6	113.9	113.0	105.5	-6.6%	1.7%	21.7%
Malaysia	-	-	-	-	2.0	2.2	2.2	1.5	2.0	1.8	3.3	85.7%	n/a	0.7%
Pakistan	-	-	-	-	-	-	1.5	4.0	6.1	9.4	11.8	25.6%	n/a	2.4%
Singapore	-	-	-	-	1.3	2.6	3.0	3.2	4.1	4.5	5.0	10.1%	n/a	1.0%
South Korea	35.3	45.0	47.7	49.7	55.3	51.8	45.8	46.3	51.4	60.2	55.6	-7.6%	4.6%	11.5%
Taiwan	12.4	15.0	16.3	17.1	17.2	18.6	19.6	20.4	22.7	22.9	22.8	-0.5%	6.2%	4.7%
Thailand	-	-	1.1	1.4	2.0	1.9	3.6	3.9	5.2	6.0	6.7	11.5%	n/a	1.4%
Other Asia Pacific	-	-	-	0.1	-	-	-	-	-	0.8	5.7	576.6%	n/a	1.2%
Total Asia Pacific	157.5	180.9	207.9	226.6	241.2	245.2	238.5	253.9	284.6	322.7	334.1	3.5%	7.1%	68.9%
Total LNG imports	249.7	302.4	328.3	324.9	326.8	333.6	337.1	358.3	393.3	430.6	485.1	12.7%	6.2%	100.0%

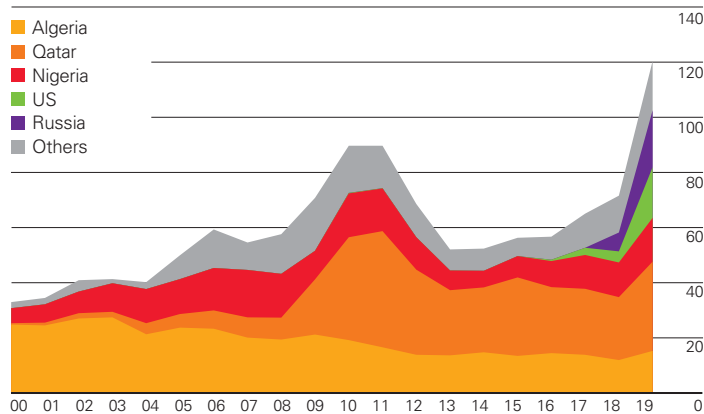
Gross LNG trade
†Less than 0.05.

♦Less than 0.05%.
n/a not available.

Source: includes GIIGNL, IHS.

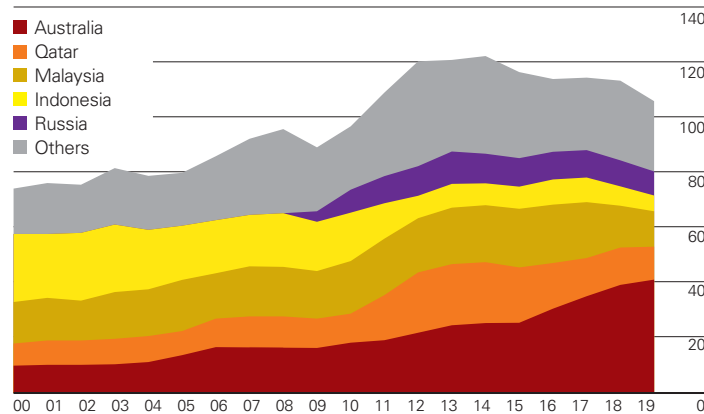
LNG imports by source: Europe

Billion cubic metres



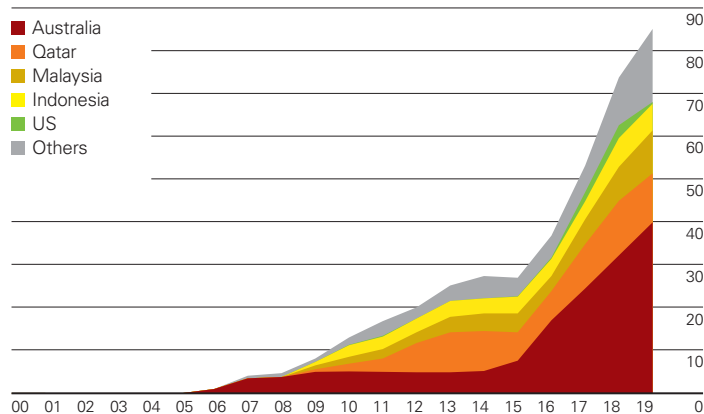
LNG imports by source: Japan

Billion cubic metres



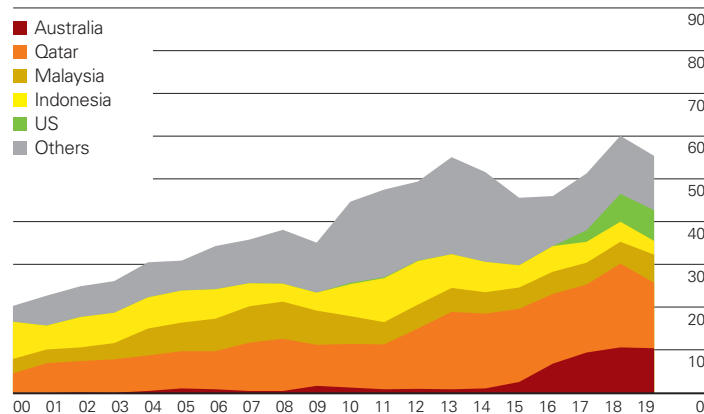
LNG imports by source: China

Billion cubic metres



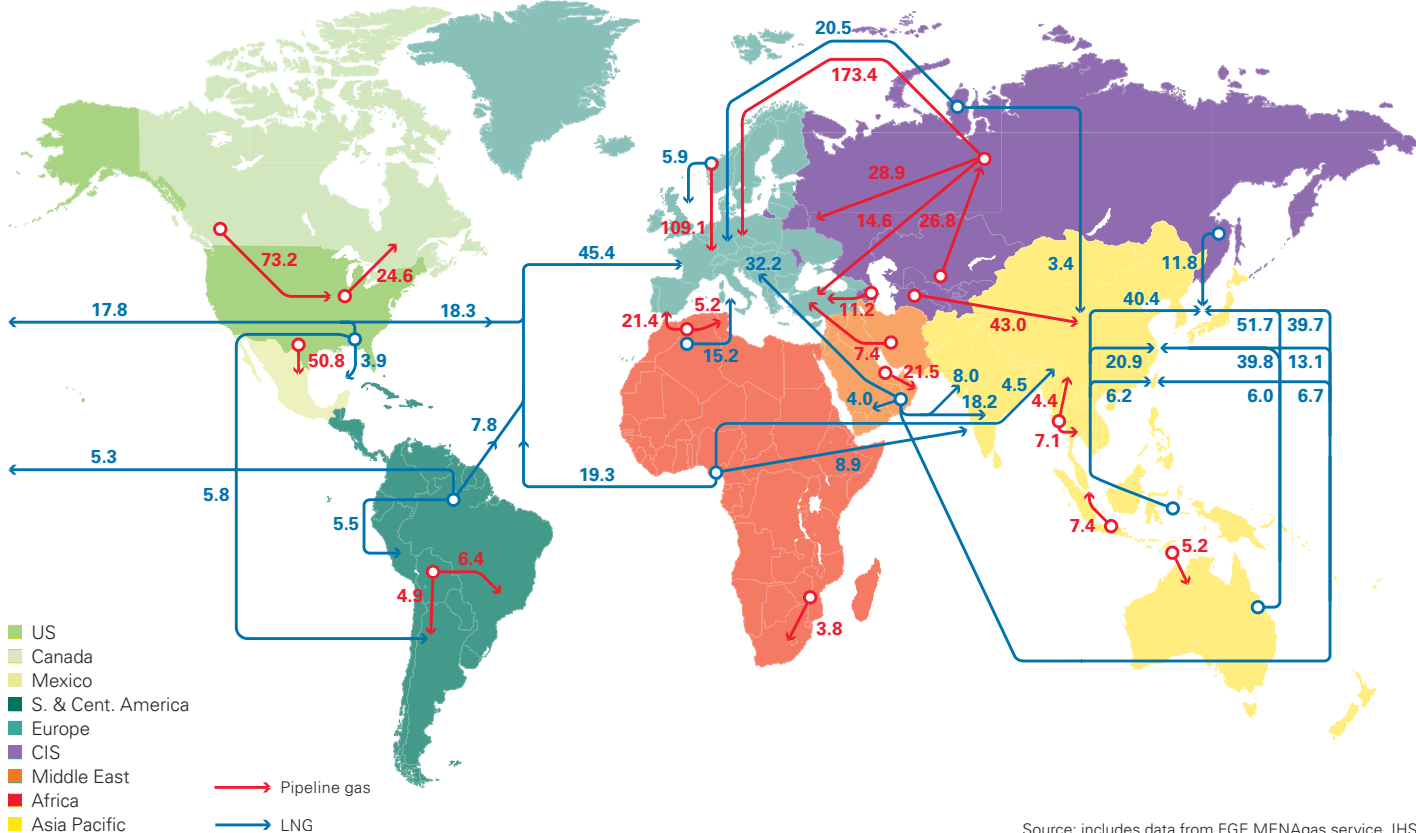
LNG imports by source: South Korea

Billion cubic metres



Major trade movements 2019

Trade flows worldwide (billion cubic metres)



Source: includes data from FGE MENA gas service, IHS.

Natural gas: Trade movements 2019 by pipeline

To	From																			Total imports					
	Canada	Mexico	US	Bolivia	Other S. & Cent. America	Netherlands	Norway	Other Europe	Azerbaijan	Kazakhstan	Russian Federation	Turkmenistan	Uzbekistan	Iran	Qatar	Other Middle East	Algeria	Libya	Other Africa		Indonesia	Myanmar	Other Asia Pacific		
Canada	-	-	24.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.6	
Mexico	-	-	50.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50.8
US	73.2	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	73.3
North America	73.2	0.1	75.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	148.7
Argentina	-	-	-	4.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.9
Brazil	-	-	-	6.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.4
Other S. & Cent. America	-	-	-	-	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7
S. & Cent. America	-	-	-	11.3	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.0
Belgium	-	-	-	-	-	6.6	5.1	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.6
France	-	-	-	-	-	4.4	19.3	5.8	-	-	7.8	-	-	-	-	-	-	-	-	-	-	-	-	-	37.2
Germany	-	-	-	-	-	23.4	27.8	2.9	-	-	55.6	-	-	-	-	-	-	-	-	-	-	-	-	-	109.6
Italy	-	-	-	-	-	1.2	2.7	14.2	-	-	20.7	-	-	-	-	-	9.7	5.4	-	-	-	-	-	-	54.1
Netherlands	-	-	-	-	-	-	25.3	6.7	-	-	8.0	-	-	-	-	-	-	-	-	-	-	-	-	-	40.0
Spain	-	-	-	-	-	-	1.8	2.8	-	-	-	-	-	-	-	-	11.4	-	-	-	-	-	-	-	16.0
Turkey	-	-	-	-	-	-	-	-	9.2	-	14.6	-	-	-	-	-	-	-	-	-	-	-	-	-	31.3
Ukraine	-	-	-	-	-	-	-	11.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.0
United Kingdom	-	-	-	-	-	1.6	26.6	0.4	-	-	4.7	-	-	-	-	-	-	-	-	-	-	-	-	-	33.2
Other EU	-	-	-	-	-	1.0	0.4	37.5	-	-	73.9	-	-	-	-	-	0.4	-	-	-	-	-	-	-	113.2
Rest of Europe	-	-	-	-	-	0.1	-	8.3	2.0	-	2.7	-	-	-	-	-	-	-	-	-	-	-	-	-	13.0
Europe	-	-	-	-	-	38.2	109.1	90.5	11.2	-	188.0	-	-	7.4	-	-	21.4	5.4	-	-	-	-	-	-	471.3
Belarus	-	-	-	-	-	-	-	-	-	-	19.0	-	-	-	-	-	-	-	-	-	-	-	-	-	19.0
Kazakhstan	-	-	-	-	-	-	-	-	-	-	5.1	-	1.8	-	-	-	-	-	-	-	-	-	-	-	6.9
Russian Federation	-	-	-	-	-	-	-	-	-	20.6	-	-	6.2	-	-	-	-	-	-	-	-	-	-	-	26.8
Other CIS	-	-	-	-	-	-	-	-	-	0.4	4.8	-	0.4	0.4	-	-	-	-	-	-	-	-	-	-	5.9
CIS	-	-	-	-	-	-	-	-	-	20.9	28.9	-	8.4	0.4	-	-	-	-	-	-	-	-	-	-	58.5
United Arab Emirates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19.5	-	-	-	-	-	-	-	-	-	19.5
Other Middle East	-	-	-	-	-	-	-	-	0.3	-	-	-	-	9.1	2.0	0.1	-	-	1.4	-	-	-	-	-	13.0
Middle East	-	-	-	-	-	-	-	-	0.3	-	-	-	-	9.1	21.5	0.1	-	-	1.4	-	-	-	-	-	32.5
South Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.8
Other Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.2	-	3.8	-	-	-	-	-	6.0
Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.2	-	4.6	-	-	-	-	-	9.8
Australia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.2	-	5.2
China	-	-	-	-	-	-	-	-	-	6.5	0.3	31.6	4.9	-	-	-	-	-	-	-	-	-	4.4	-	47.7
Malaysia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	0.6
Singapore	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.8	-	-	8.1
Thailand	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.1	-	-	7.1
Asia Pacific	-	-	-	-	-	-	-	-	-	6.5	0.3	31.6	4.9	-	-	-	-	-	-	-	-	7.4	11.5	6.5	68.7
Total exports	73.2	0.1	75.4	11.3	0.7	38.2	109.1	90.5	11.5	27.5	217.2	31.6	13.2	16.9	21.5	0.1	26.7	5.4	6.0	7.4	11.5	6.5	6.5	6.5	801.5

Source: includes data from FGE MENA gas service, IHS.

Note: As far as possible, the data above represents standard cubic metres (measured at 15°C and 1013 mbar) and has been standardized using a gross calorific value (GCV) of 40 MJ/m³.

Total proved reserves at end 2019

Million tonnes	Anthracite and bituminous	Sub-bituminous and lignite	Total	Share of Total	R/P ratio
Canada	4346	2236	6582	0.6%	130
Mexico	1160	51	1211	0.1%	108
US	219534	30003	249537	23.3%	390
Total North America	225040	32290	257330	24.1%	367
Brazil	1547	5049	6596	0.6%	*
Colombia	4554	–	4554	0.4%	55
Venezuela	731	–	731	0.1%	*
Other S. & Cent. America	1784	24	1808	0.2%	*
Total S. & Cent. America	8616	5073	13689	1.3%	152
Bulgaria	192	2174	2366	0.2%	153
Czech Republic	413	2514	2927	0.3%	71
Germany	–	35900	35900	3.4%	268
Greece	–	2876	2876	0.3%	105
Hungary	276	2633	2909	0.3%	425
Poland	21067	5865	26932	2.5%	240
Romania	11	280	291	♦	13
Serbia	402	7112	7514	0.7%	193
Spain	868	319	1187	0.1%	*
Turkey	550	10975	11525	1.1%	140
Ukraine	32039	2336	34375	3.2%	*
United Kingdom	26	–	26	♦	12
Other Europe	1109	5172	6281	0.6%	141
Total Europe	56953	78156	135109	12.6%	244
Kazakhstan	25605	–	25605	2.4%	222
Russian Federation	71719	90447	162166	15.2%	369
Uzbekistan	1375	–	1375	0.1%	339
Other CIS	1509	–	1509	0.1%	331
Total CIS	100208	90447	190655	17.8%	338
South Africa	9893	–	9893	0.9%	39
Zimbabwe	502	–	502	♦	215
Other Africa	4376	66	4442	0.4%	202
Middle East	1203	–	1203	0.1%	*
Total Middle East & Africa	15974	66	16040	1.5%	57
Australia	72571	76508	149079	13.9%	294
China	133467	8128	141595	13.2%	37
India	100858	5073	105931	9.9%	140
Indonesia	28163	11728	39891	3.7%	65
Japan	340	10	350	♦	462
Mongolia	1170	1350	2520	0.2%	44
New Zealand	825	6750	7575	0.7%	*
Pakistan	207	2857	3064	0.3%	481
South Korea	326	–	326	♦	300
Thailand	–	1063	1063	0.1%	76
Vietnam	3116	244	3360	0.3%	73
Other Asia Pacific	1333	726	2059	0.2%	32
Total Asia Pacific	342376	114437	456813	42.7%	77
Total World	749167	320469	1069636	100.0%	132
of which: OECD	324066	177130	501196	46.9%	308
Non-OECD	425101	143339	568440	53.1%	88
European Union	23434	53051	76485	7.2%	209

*More than 500 years.

♦Less than 0.05%.

Source: Federal Institute for Geosciences and Natural Resources (BGR) Energy Study 2020.

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.

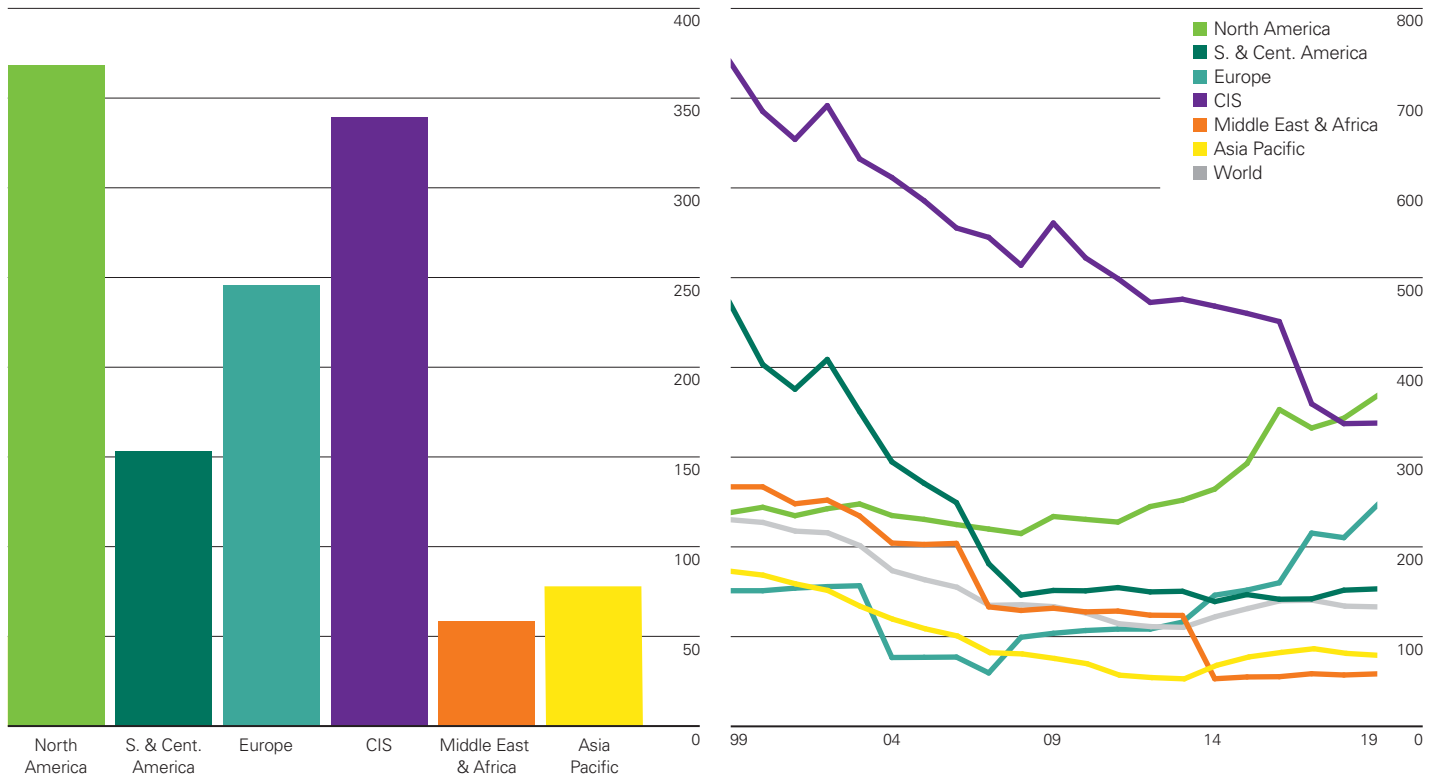
Reserves-to-production (R/P) ratios are calculated excluding other solid fuels in reserves and production.

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

Reserves-to-production (R/P) ratios

Years

2019 by region

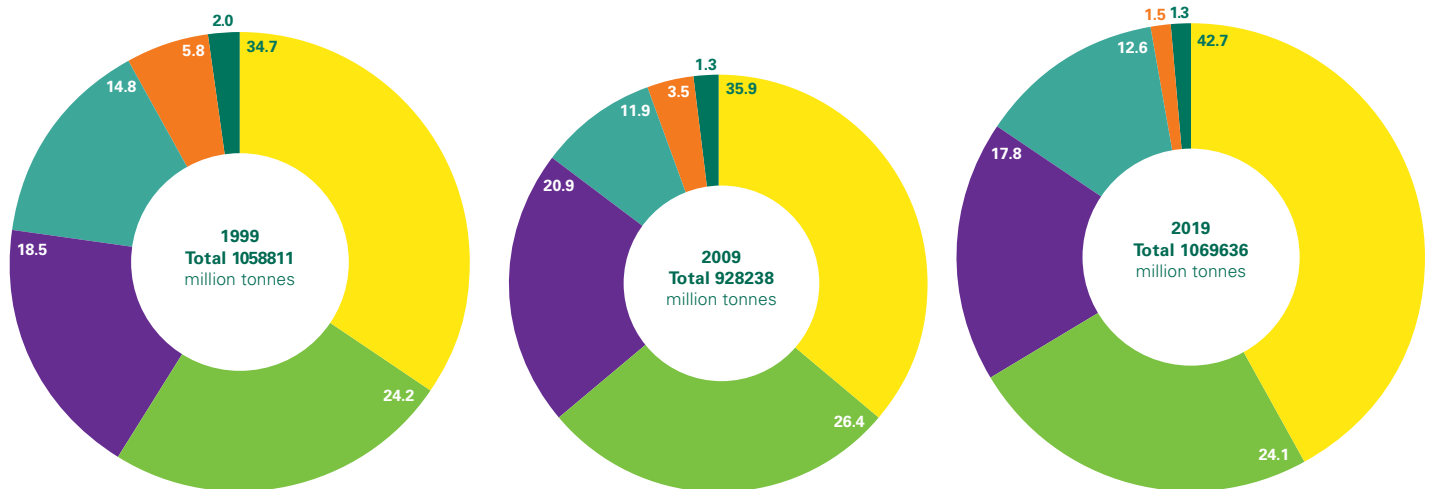


World coal reserves in 2019 stood at 1070 billion tonnes and are heavily concentrated in just a few countries: US (23%), Russia (15%), Australia (14%) and China (13%). Most of the reserves are anthracite and bituminous (70%). The current global R/P ratio shows that coal reserves in 2019 accounted for 132 years of current production with North America (367 years) and CIS (338 years) the regions with the highest ratios.

Distribution of proved reserves in 1999, 2009 and 2019

Percentage

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



Coal: Production*

Exajoules	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Growth rate per annum		Share 2019
												2019	2008-18	
Canada	1.39	1.48	1.48	1.49	1.51	1.50	1.35	1.37	1.32	1.18	1.11	-5.1%	-2.3%	0.7%
Mexico	0.25	0.31	0.39	0.31	0.30	0.30	0.29	0.25	0.31	0.28	0.26	-5.4%	-0.4%	0.2%
US	21.67	22.09	22.27	20.72	20.05	20.33	17.99	14.70	15.66	15.40	14.30	-7.1%	-4.3%	8.5%
Total North America	23.32	23.88	24.15	22.52	21.86	22.14	19.63	16.33	17.29	16.85	15.68	-7.0%	-4.1%	9.4%
Brazil	0.13	0.11	0.11	0.12	0.15	0.15	0.12	0.11	0.09	0.10	0.12	24.8%	-3.2%	0.1%
Colombia	2.09	2.14	2.47	2.56	2.46	2.55	2.46	2.60	2.60	2.42	2.37	-2.2%	1.4%	1.4%
Venezuela	0.10	0.08	0.08	0.06	0.04	0.02	0.02	0.01	0.01	0.01	0.01	49.1%	-27.5%	♦
Other S. & Cent. America	0.02	0.01	0.02	0.02	0.07	0.12	0.10	0.08	0.05	0.05	0.03	-27.2%	12.0%	♦
Total S. & Cent. America	2.34	2.35	2.68	2.76	2.72	2.85	2.70	2.81	2.76	2.58	2.54	-1.5%	0.6%	1.5%
Bulgaria	0.19	0.21	0.26	0.23	0.20	0.21	0.25	0.21	0.24	0.22	0.20	-7.6%	0.8%	0.1%
Czech Republic	0.87	0.87	0.88	0.85	0.74	0.71	0.71	0.67	0.64	0.62	0.57	-8.2%	-4.3%	0.3%
Germany	1.94	1.92	1.96	2.00	1.89	1.85	1.79	1.66	1.65	1.58	1.27	-20.0%	-2.8%	0.8%
Greece	0.34	0.31	0.31	0.34	0.28	0.27	0.24	0.17	0.19	0.18	0.13	-25.1%	-6.2%	0.1%
Hungary	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.05	0.05	0.06	18.1%	-2.8%	♦
Poland	2.36	2.32	2.33	2.42	2.39	2.26	2.22	2.18	2.08	1.98	1.87	-5.5%	-2.5%	1.1%
Romania	0.27	0.25	0.28	0.27	0.19	0.19	0.20	0.18	0.19	0.17	0.16	-8.4%	-5.2%	0.1%
Serbia	0.31	0.30	0.33	0.31	0.32	0.24	0.30	0.30	0.30	0.28	0.29	3.4%	-1.2%	0.2%
Spain	0.16	0.14	0.11	0.10	0.07	0.07	0.05	0.03	0.05	0.04	†	-97.4%	-14.4%	♦
Turkey	0.73	0.73	0.75	0.71	0.65	0.68	0.54	0.65	0.63	0.69	0.70	0.4%	-0.1%	0.4%
Ukraine	1.35	1.35	1.52	1.64	1.60	1.09	0.72	0.76	0.57	0.59	0.57	-2.3%	-8.7%	0.3%
United Kingdom	0.46	0.48	0.48	0.44	0.33	0.31	0.23	0.11	0.08	0.07	0.06	-16.1%	-17.5%	♦
Other Europe	0.65	0.66	0.66	0.59	0.69	0.66	0.60	0.56	0.57	0.82	0.65	-21.1%	2.5%	0.4%
Total Europe	9.71	9.60	9.94	9.96	9.43	8.60	7.90	7.55	7.25	7.28	6.52	-10.5%	-3.4%	3.9%
Kazakhstan	1.82	1.99	2.08	2.16	2.15	2.05	1.93	1.85	2.02	2.13	2.08	-2.4%	0.6%	1.2%
Russian Federation	5.93	6.32	6.60	7.05	7.25	7.39	7.80	8.12	8.62	9.23	9.20	-0.3%	4.0%	5.5%
Uzbekistan	0.04	0.04	0.05	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	-2.9%	1.5%	♦
Other CIS	0.04	0.04	0.05	0.05	0.06	0.06	0.06	0.07	0.08	0.10	0.10	4.7%	10.7%	0.1%
Total CIS	7.83	8.39	8.77	9.31	9.51	9.55	9.84	10.09	10.77	11.51	11.43	-0.6%	3.3%	6.8%
Total Middle East	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.03	0.03	-	-3.4%	♦
South Africa	5.85	6.03	6.00	6.14	6.08	6.20	5.96	6.01	5.97	5.99	6.02	0.4%	0.2%	3.6%
Zimbabwe	0.05	0.07	0.07	0.04	0.08	0.16	0.12	0.07	0.08	0.10	0.06	-35.0%	9.0%	♦
Other Africa	0.03	0.04	0.05	0.18	0.21	0.24	0.25	0.32	0.59	0.74	0.57	-22.4%	36.9%	0.3%
Total Africa	5.92	6.15	6.11	6.36	6.38	6.59	6.33	6.41	6.64	6.83	6.66	-2.6%	1.3%	4.0%
Australia	10.16	10.49	10.26	11.13	11.97	12.81	12.80	12.83	12.50	13.06	13.15	0.7%	2.9%	7.8%
China	64.39	69.72	77.53	78.44	79.32	78.05	76.43	70.82	73.17	76.58	79.82	4.2%	2.1%	47.6%
India	10.30	10.56	10.50	10.68	10.71	11.28	11.77	11.89	11.99	12.80	12.73	-0.5%	3.0%	7.6%
Indonesia	6.32	6.79	8.72	9.52	11.71	11.30	11.39	11.25	11.38	13.76	15.05	9.4%	8.8%	9.0%
Japan	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	-27.1%	-1.6%	♦
Mongolia	0.28	0.48	0.63	0.59	0.64	0.47	0.46	0.67	0.94	1.04	1.09	4.7%	18.4%	0.6%
New Zealand	0.12	0.14	0.13	0.13	0.12	0.10	0.09	0.07	0.07	0.08	0.08	-5.8%	-4.3%	♦
Pakistan	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.08	0.08	0.08	0.12	45.9%	0.9%	0.1%
South Korea	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.02	0.02	-9.4%	-7.9%	♦
Thailand	0.20	0.21	0.25	0.20	0.20	0.19	0.16	0.18	0.17	0.16	0.15	-6.1%	-2.4%	0.1%
Vietnam	1.03	1.05	1.09	0.98	0.96	0.96	0.97	0.90	0.90	0.98	1.08	10.2%	0.6%	0.6%
Other Asia Pacific	0.81	0.87	0.93	0.96	0.98	0.99	1.06	1.33	1.14	1.39	1.42	2.2%	4.1%	0.8%
Total Asia Pacific	93.74	100.44	110.16	112.76	116.71	116.29	115.24	110.08	112.41	119.98	124.72	4.0%	2.9%	74.4%
Total World	142.89	150.82	161.84	163.70	166.64	166.05	161.68	153.30	157.16	165.06	167.58	1.5%	1.4%	100.0%
of which: OECD	41.04	41.85	41.92	41.14	40.95	41.86	38.84	35.19	35.66	35.67	33.90	-5.0%	-2.0%	20.2%
Non-OECD	101.86	108.97	119.92	122.56	125.69	124.19	122.84	118.11	121.50	129.39	133.68	3.3%	2.7%	79.8%
European Union	7.02	6.93	7.05	7.03	6.58	6.29	6.05	5.55	5.47	5.28	4.59	-13.2%	-3.4%	2.7%

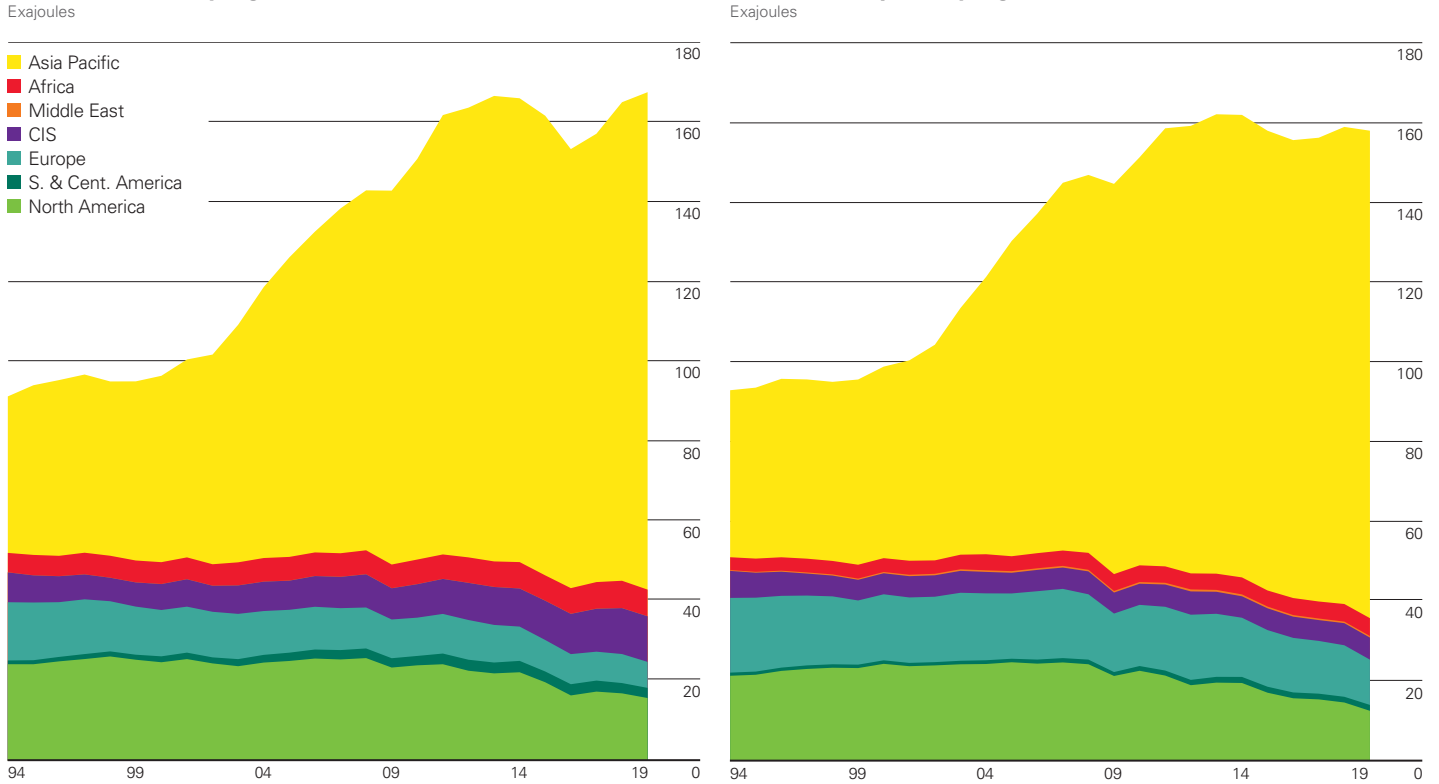
*Commercial solid fuels only, i.e. bituminous coal and anthracite (hard coal), and lignite and brown (sub-bituminous) coal, and other commercial solid fuels. Includes coal produced for coal-to-liquids and coal-to-gas transformations.

†Less than 0.005.

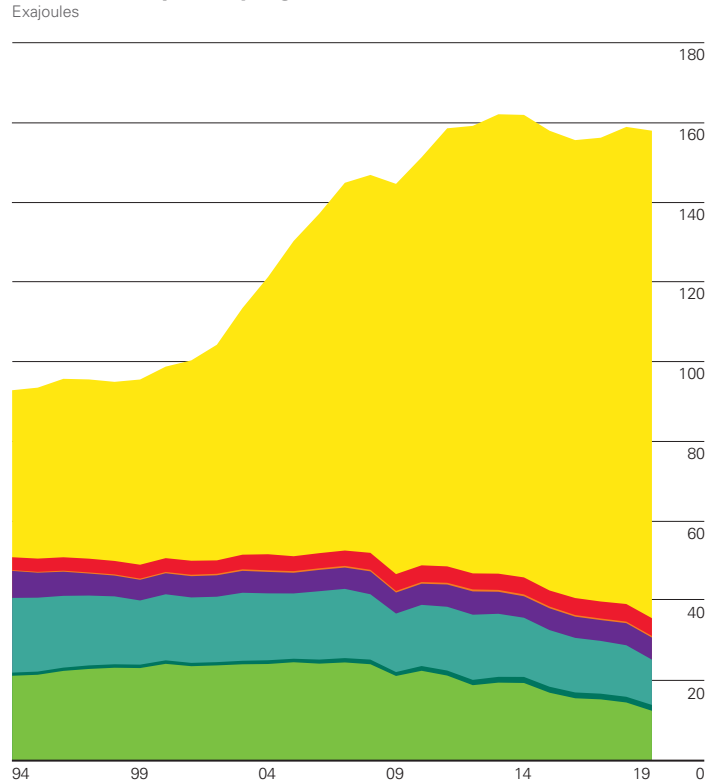
♦Less than 0.05%.

Coal production data expressed in million tonnes is available at bp.com/statisticalreview.

Coal: Production by region



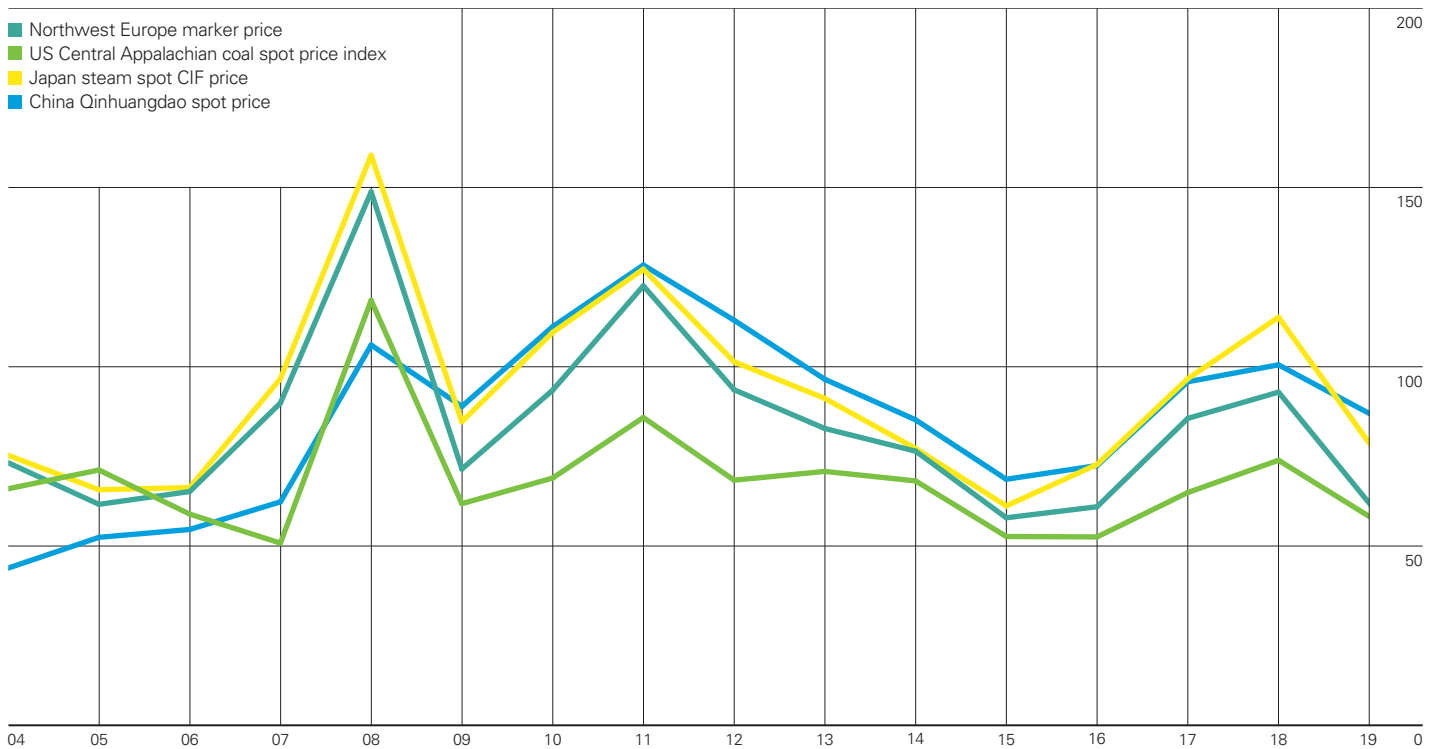
Coal: Consumption by region



World coal consumption fell by 0.6% (-0.9 EJ), its fourth decline in six years. In the non-OECD, there were notable increases in China (1.8 EJ), Indonesia (0.6 EJ) and Vietnam (0.5 EJ), however, growth in India was only 0.3% (0.1 EJ) – its lowest since 2001. OECD demand fell sharply, led by the US (-1.9 EJ) and Germany (-0.6 EJ), to the lowest level in our data series (which goes back to 1965). Global coal production rose by 1.5%, with China and Indonesia providing the only significant increases (3.2 EJ and 1.3 EJ respectively). The largest declines in production also came from the US (-1.1 EJ) and Germany (-0.3 EJ).

Coal prices

US dollars per tonne



Coal: 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†
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	72.13	64.90	74.22	42.76
2005	60.54	70.12	64.62	51.34
2006	64.11	57.82	65.22	53.53
2007	88.79	49.73	95.59	61.23
2008	147.67	117.42	157.88	104.97
2009	70.39	60.73	83.59	87.86
2010	92.35	67.87	108.47	110.08
2011	121.48	84.75	126.13	127.27
2012	92.50	67.28	100.30	111.89
2013	81.69	69.72	90.07	95.42
2014	75.38	67.08	76.13	84.12
2015	56.79	51.57	60.10	67.53
2016	59.87	51.45	71.66	71.35
2017	84.51	63.83	95.57	94.72
2018	91.83	72.84	112.73	99.45
2019	60.86	57.16	77.63	85.89

†Source: IHS Northwest Europe prices for 1999-2000 are the average of the monthly marker, 2001-2019 the average of weekly prices. IHS Japan prices basis = 6,000 kilocalories per kilogram NAR CIF. Chinese prices are the average monthly price for 2000-2005, weekly prices 2006-2019, 5,500 kilocalories per kilogram NAR, including cost and freight (CFR).

‡Source: S&P Global Platts ©2020, S&P Global Inc. Prices are for Central Appalachian 12,500 BTU, 1.2 SO₂ coal, FOB. Prices for 1999-2000 are by coal price publication date, 2001-2005 by coal price assessment date, 2006-2019 weekly CAPP 12,500 BTU, 1.6 SO₂ coal, FOB.

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

Coal: Trade movements

Exajoules												Growth rate per annum		Share 2019
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019	2008-18	
Imports														
Canada	0.36	0.36	0.24	0.23	0.22	0.26	0.22	0.19	0.22	0.23	0.21	-11.7%	-10.0%	0.6%
Mexico	0.18	0.22	0.21	0.22	0.20	0.22	0.23	0.21	0.34	0.34	0.24	-27.9%	9.9%	0.7%
US	0.57	0.51	0.36	0.27	0.24	0.28	0.28	0.25	0.19	0.15	0.17	11.5%	-16.7%	0.5%
S. & Cent. America	0.67	0.85	0.99	0.88	1.06	1.06	1.00	1.06	1.21	1.19	1.12	-6.2%	1.8%	3.2%
Europe	5.01	4.82	5.64	6.09	5.85	6.09	6.03	5.40	5.86	6.44	5.25	-18.4%	0.4%	14.9%
CIS	0.52	0.37	0.59	0.53	0.56	0.56	0.53	0.48	0.56	0.61	0.65	7.9%	-1.2%	1.9%
Middle East	0.40	0.35	0.43	0.49	0.44	0.49	0.38	0.34	0.35	0.35	0.32	-7.1%	-4.2%	0.9%
Africa	0.27	0.32	0.35	0.31	0.83	0.39	0.47	0.51	0.60	0.73	0.64	-12.0%	7.8%	1.8%
China	3.28	4.45	5.20	6.71	7.63	6.62	4.69	5.65	5.87	6.13	6.40	4.3%	19.4%	18.1%
India	1.80	2.00	2.37	3.09	3.66	4.65	4.92	6.46	5.15	5.28	5.69	7.9%	14.1%	16.1%
Japan	4.22	4.84	4.61	4.87	5.06	5.00	5.05	5.01	5.06	5.01	4.90	-2.2%	♦	13.9%
South Korea	2.69	3.11	3.38	3.30	3.32	3.43	3.54	3.89	3.92	3.92	3.73	-4.7%	4.0%	10.6%
Other Asia Pacific	2.79	3.18	3.29	3.65	3.61	2.73	3.96	4.60	5.00	5.37	5.96	10.9%	6.0%	16.9%
Total World	22.75	25.39	27.66	30.62	32.66	31.78	31.29	33.70	34.29	35.74	35.28	-1.3%	4.2%	100.0%
Exports														
Canada	0.72	0.92	1.03	0.99	1.13	1.00	0.86	0.78	0.94	1.04	1.03	-0.3%	2.9%	2.9%
US	1.46	2.02	2.51	3.02	2.89	2.38	1.90	1.53	2.40	2.89	2.39	-17.5%	3.4%	6.8%
Colombia	1.63	1.78	2.02	2.25	2.05	2.27	2.19	2.33	2.48	2.43	2.10	-13.5%	2.1%	5.9%
Europe	0.23	0.12	0.16	0.20	0.68	0.13	0.10	0.13	0.19	0.25	0.23	-8.3%	0.1%	0.7%
Russia	2.45	2.50	2.86	3.23	3.55	3.78	4.11	4.47	5.09	5.78	5.87	1.5%	9.4%	16.6%
Other CIS	0.50	0.35	0.58	0.50	0.51	0.51	0.48	0.45	0.47	0.51	0.54	5.9%	-2.3%	1.5%
South Africa	1.93	1.98	2.04	2.22	2.10	2.18	2.30	2.16	2.52	2.33	2.20	-5.8%	2.9%	6.2%
Other Africa	0.03	0.11	0.04	0.13	0.12	0.19	0.28	2.02	0.65	0.22	0.28	27.7%	21.5%	0.8%
Australia	6.99	7.46	7.04	7.96	9.19	9.12	9.95	9.87	9.70	9.78	9.69	-0.9%	4.1%	27.5%
China	0.59	0.59	0.44	0.28	0.28	0.36	0.45	0.51	0.42	0.42	0.34	-18.0%	-12.3%	1.0%
Indonesia	5.07	6.20	7.18	8.16	8.57	8.42	7.48	7.73	8.08	8.56	9.18	7.2%	6.4%	26.0%
Mongolia	0.17	0.48	0.58	0.63	0.49	0.53	0.41	0.73	0.95	0.99	1.02	3.2%	24.0%	2.9%
Other Asia Pacific	0.82	0.76	1.01	0.90	0.92	0.77	0.65	0.77	0.30	0.39	0.29	-26.3%	-5.0%	0.8%
Rest of World	0.15	0.13	0.16	0.15	0.19	0.14	0.14	0.22	0.12	0.15	0.13	-13.9%	-3.6%	0.4%
Total World	22.75	25.39	27.66	30.62	32.66	31.78	31.29	33.70	34.29	35.74	35.28	-1.3%	4.2%	100.0%

♦Less than 0.05%.

Note: Commercial solid fuels only, i.e. bituminous coal and anthracite (hard coal), and lignite and brown (sub-bituminous) coal, and other commercial solid fuels. Intra-area movements (for example between countries in Europe, Other CIS, Other Africa, Other Asia Pacific) are excluded.

Coal: Inter-area movements 2019

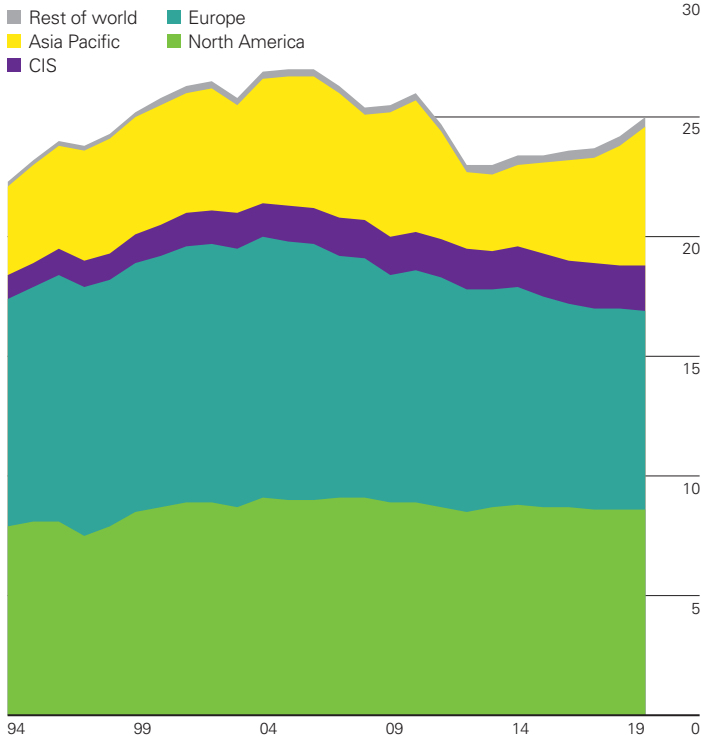
Exajoules	To													Total
	Canada	Mexico	US	S. & Cent. America	Europe	CIS	Middle East	Africa	China	India	Japan	South Korea	Other Asia Pacific	
Canada	–	†	0.02	0.03	0.11	–	†	†	0.10	0.08	0.26	0.33	0.11	1.03
US	0.15	0.07	–	0.28	0.85	†	†	0.23	0.03	0.32	0.36	0.10	†	2.39
Colombia	0.05	0.13	0.12	0.54	0.84	†	0.13	0.01	0.05	0.03	0.03	0.14	0.03	2.10
Europe	†	†	†	†	–	0.08	†	0.03	†	0.08	†	0.01	0.01	0.23
Russia	†	0.04	†	0.07	2.41	0.17	0.10	0.14	0.82	0.22	0.54	0.78	0.58	5.87
Other CIS	–	–	–	–	0.13	0.41	†	–	0.01	†	–	–	†	0.54
South Africa	–	–	†	0.02	0.09	–	0.07	0.15	†	1.20	0.01	0.11	0.54	2.20
Other Africa	–	–	†	0.01	0.07	–	†	0.02	†	0.12	0.03	0.03	†	0.28
Australia	–	†	–	0.15	0.65	–	†	0.05	2.06	0.83	2.88	1.36	1.71	9.69
China	†	†	†	0.01	0.02	†	0.01	0.01	–	0.03	0.07	0.06	0.14	0.34
Indonesia	–	–	0.02	†	0.07	–	0.01	†	2.19	2.61	0.70	0.80	2.78	9.18
Mongolia	–	–	–	–	–	†	–	–	1.02	–	–	†	–	1.02
Other Asia Pacific	†	†	†	†	0.02	†	†	†	0.13	0.13	0.02	0.02	0.04	0.35
Rest of World	†	†	†	†	0.02	†	†	†	†	0.04	†	†	†	0.07
Total imports	0.21	0.24	0.17	1.12	5.25	0.65	0.32	0.64	6.40	5.69	4.90	3.73	5.96	35.28

†Less than 0.005.

Note: Commercial solid fuels only, i.e. bituminous coal and anthracite (hard coal), and lignite and brown (sub-bituminous) coal, and other commercial solid fuels. Intra-area movements (for example, between countries in Europe, Other CIS, Other Africa, Other Asia Pacific) are excluded.

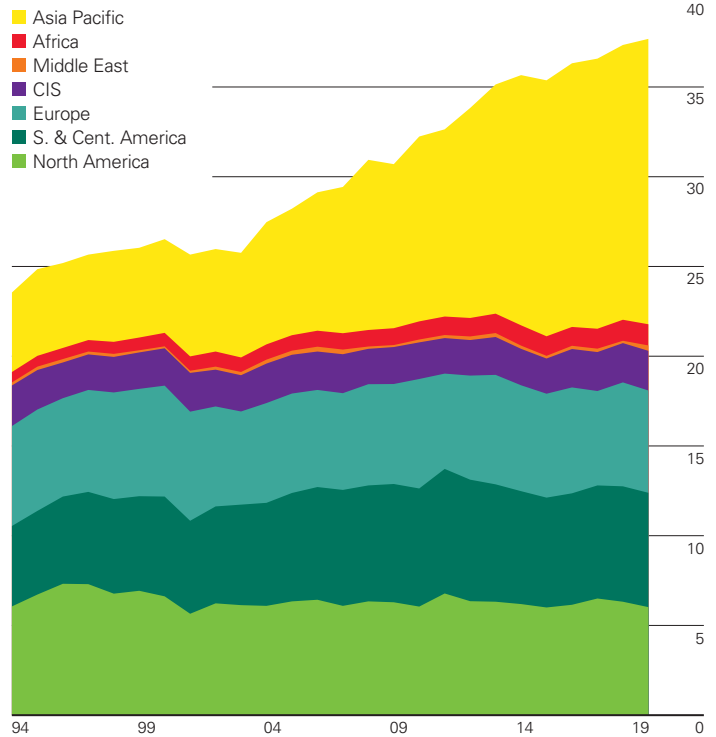
Nuclear energy consumption by region

Exajoules



Hydroelectricity consumption by region

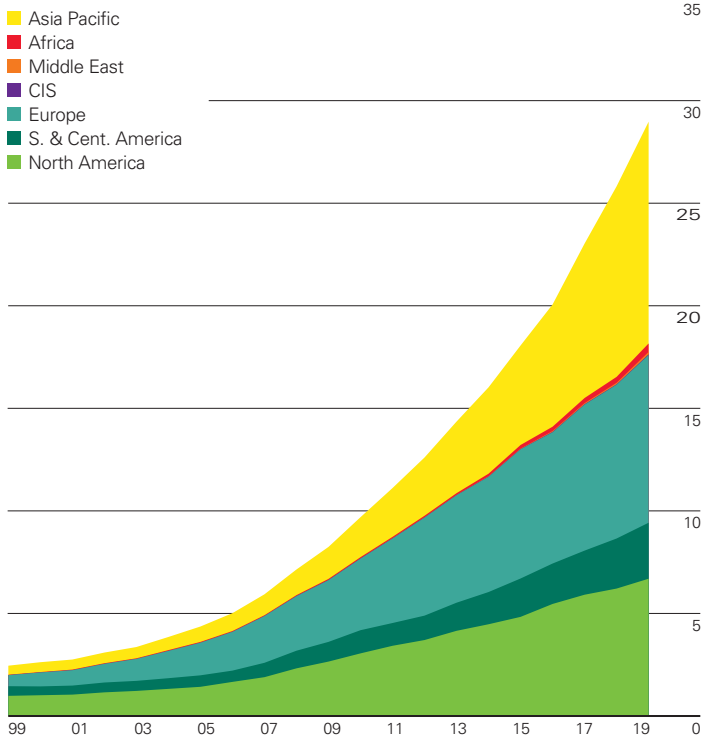
Exajoules



Nuclear consumption increased by 3.2% (on an input-equivalent basis), its fastest growth since 2004 and well above the 10-year average of -0.7%. As in 2018, China recorded the largest increment of any country, and last year's increase was China's largest ever (0.5 EJ). Japan also posted notable growth of 0.15 EJ, or 33% as it continued to recover from the complete shutdown of generation in 2014. Hydroelectric consumption rose by 0.8%, below the 10-year average of 1.9%. Growth was led by China (0.6 EJ), Turkey (0.3 EJ) and India (0.2 EJ). The US and Vietnam saw the biggest declines (both -0.2 EJ).

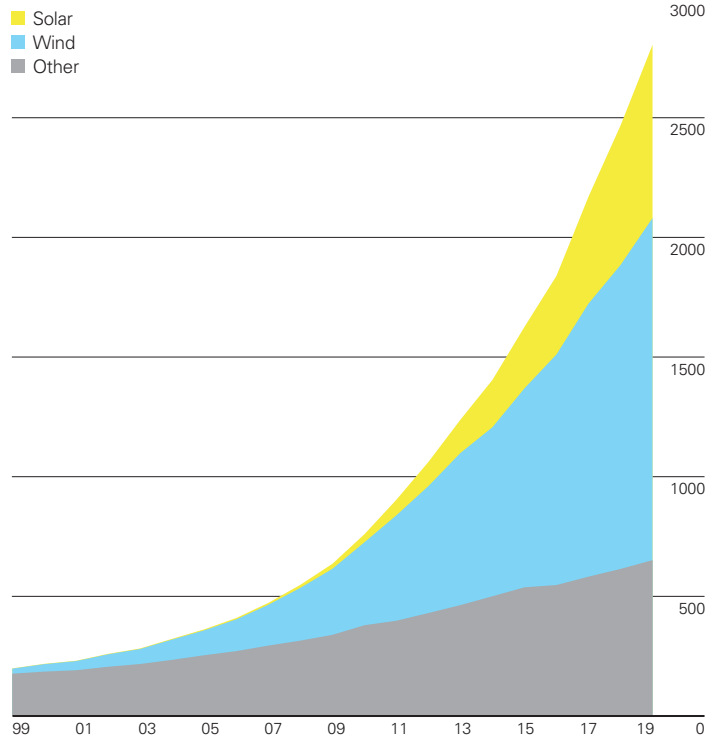
Renewables consumption by region

Exajoules



Renewables generation by source

Terawatt-hours



Renewable energy consumption (including biofuels but excluding hydro) grew by 12.1%, below its historical average, although its increase in energy terms (3.2 EJ) was the highest on record and the largest for any fuel in 2019. By country, China was the largest contributor to renewables growth (0.8 EJ), followed by the US (0.3 EJ) and Japan (0.2 EJ). Wind provided the largest contribution to the growth of renewables electricity generation (160 TWh) followed closely by solar (140 TWh). Solar has constantly increased its share of renewable generation and now makes up 26% compared with only 14% five years earlier.

Renewables consumption*

Exajoules (input-equivalent)	2009-2018											Growth rate per annum		Share 2019
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019	2008-18	
Total North America	2.66	3.06	3.43	3.71	4.16	4.48	4.84	5.47	5.92	6.22	6.70	7.6%	10.3%	23.1%
Total S. & Cent. America	0.96	1.13	1.11	1.19	1.37	1.57	1.87	1.97	2.15	2.44	2.73	11.9%	10.9%	9.4%
Total Europe	3.01	3.49	4.12	4.78	5.24	5.62	6.30	6.40	7.12	7.50	8.18	9.2%	10.9%	28.2%
Total CIS	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03	29.4%	15.9%	0.1%
Total Middle East	†	†	0.01	0.01	0.01	0.02	0.02	0.04	0.05	0.07	0.12	77.1%	38.8%	0.4%
Total Africa	0.05	0.06	0.06	0.07	0.08	0.12	0.18	0.21	0.25	0.29	0.41	39.3%	20.7%	1.4%
Total Asia Pacific	1.56	1.95	2.38	2.84	3.49	4.21	4.85	5.96	7.53	9.29	10.81	16.5%	22.2%	37.3%
Total World	8.24	9.70	11.12	12.60	14.36	16.03	18.08	20.06	23.04	25.83	28.98	12.2%	13.7%	100.0%
of which: OECD	6.16	7.12	8.16	9.13	10.12	10.94	12.18	12.96	14.32	15.27	16.77	9.8%	10.9%	57.9%
Non-OECD	2.08	2.58	2.96	3.47	4.24	5.09	5.90	7.10	8.71	10.55	12.21	15.7%	19.9%	42.1%
European Union	2.92	3.38	3.98	4.62	5.02	5.38	6.02	6.05	6.69	6.97	7.54	8.2%	10.5%	26.0%

*Based on gross generation and not accounting for cross-border electricity supply. †Input-equivalent energy is the amount of fuel that would be required by thermal power stations to generate the reported electricity output. Details on thermal efficiency assumptions are available in the appendices and definitions page and at [bp.com/statisticalreview](https://www.bp.com/statisticalreview).

†Less than 0.005.

*Less than 0.05%.

Annual changes and share of total are calculated using exajoules figures and incorporate adjustments for assumed changes in thermal efficiency.

Other renewables data expressed in terawatt-hours is available at [bp.com/statisticalreview](https://www.bp.com/statisticalreview).

Renewables: Biofuels production*

Thousand barrels of oil equivalent per day	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Growth rate per annum		Share 2019
												2019	2008-18	
Canada	14	16	19	20	19	21	22	23	25	25	29	14.4%	9.4%	1.6%
Mexico	–	†	†	†	†	†	†	†	†	†	†	–	–	♦
US	445	526	585	557	582	617	634	673	696	717	697	-2.7%	6.2%	37.9%
Total North America	460	542	604	577	601	638	656	696	722	742	726	-2.1%	6.3%	39.4%
Argentina	19	32	42	43	38	49	38	53	58	51	46	-9.9%	16.1%	2.5%
Brazil	286	316	270	276	321	337	362	340	342	413	444	7.6%	3.6%	24.1%
Colombia	5	8	10	11	12	12	12	12	11	14	13	-4.6%	18.7%	0.7%
Other S. & Cent. America	4	4	5	5	7	8	8	10	10	11	12	7.2%	2.1%	0.7%
Total S. & Cent. America	315	360	327	335	378	406	421	415	422	489	516	5.4%	4.6%	28.0%
Austria	7	7	7	7	7	6	7	8	7	7	7	-1.7%	3.7%	0.4%
Belgium	3	7	8	8	8	11	7	7	8	8	9	7.9%	–	0.5%
Finland	4	6	4	5	6	7	8	2	6	5	6	4.9%	12.8%	0.3%
France	44	43	42	49	48	51	53	49	52	58	51	-13.1%	4.1%	2.7%
Germany	47	59	58	54	58	65	60	60	62	64	64	0.6%	3.1%	3.5%
Italy	14	15	11	6	9	10	10	10	12	13	14	12.2%	0.8%	0.8%
Netherlands	5	7	13	24	28	34	36	29	37	36	35	-1.8%	37.8%	1.9%
Poland	8	8	8	12	13	14	15	17	17	17	18	5.5%	12.1%	1.0%
Portugal	4	5	6	5	5	6	6	6	6	6	7	20.2%	8.2%	0.4%
Spain	17	19	16	12	14	19	21	22	29	34	30	-13.4%	17.0%	1.6%
Sweden	3	4	4	4	4	4	4	4	3	4	4	26.3%	3.6%	0.2%
United Kingdom	4	5	3	6	9	7	6	10	14	13	11	-14.9%	9.2%	0.6%
Other Europe	20	20	22	26	28	28	32	33	35	39	40	2.5%	8.9%	2.2%
Total Europe	180	205	201	218	237	262	265	257	289	304	296	-2.6%	7.6%	16.1%
Total CIS	†	†	†	†	†	†	†	†	†	†	†	–	12.1%	♦
Total Middle East	†	†	†	†	†	†	†	†	†	†	†	–	–	♦
Total Africa	5	6	6	4	4	5	7	7	8	9	9	6.6%	25.5%	0.5%
Australia	4	3	4	4	5	5	4	4	2	3	3	6.3%	-0.7%	0.2%
China	31	30	37	39	44	49	42	40	49	47	50	6.6%	5.3%	2.7%
India	2	4	5	5	5	5	10	12	11	19	24	24.9%	20.9%	1.3%
Indonesia	3	4	27	33	41	59	24	54	50	91	123	35.7%	27.1%	6.7%
South Korea	4	6	5	7	7	7	8	8	8	8	8	-3.2%	11.3%	0.4%
Thailand	12	16	17	24	30	34	36	31	37	40	43	8.1%	14.9%	2.3%
Other Asia Pacific	8	8	16	22	28	34	36	34	33	35	43	21.6%	17.0%	2.3%
Total Asia Pacific	65	69	111	133	160	193	161	183	191	243	294	21.0%	14.6%	15.9%
Total World	1025	1183	1250	1268	1381	1505	1511	1560	1631	1787	1842	3.0%	6.8%	100.0%
of which: OECD	646	755	811	803	846	908	929	961	1016	1052	1027	-2.3%	6.7%	55.8%
Non-OECD	378	428	439	465	535	597	581	599	615	736	814	10.6%	7.1%	44.2%
European Union	179	204	199	216	235	260	262	254	285	299	291	-2.8%	7.6%	15.8%
Biofuels production by fuel type														
Biogasoline														
Canada & Mexico	13	15	17	17	17	17	17	17	18	19	22	11.9%	8.2%	1.9%
US	417	507	531	502	506	545	564	585	607	613	601	-2.0%	5.7%	52.6%
Brazil	263	281	231	236	278	287	304	284	279	334	357	6.9%	2.1%	31.3%
Other S. & Cent. America	6	7	9	10	13	16	18	21	22	24	24	1.0%	8.0%	2.1%
Europe	31	36	41	47	53	53	58	54	57	59	57	-3.7%	8.7%	4.9%
CIS	–	–	–	–	†	†	†	†	†	†	†	–	–	♦
Middle East	†	†	†	†	†	†	†	†	†	†	†	–	–	♦
Africa	5	6	6	4	4	5	6	6	5	6	6	0.5%	20.8%	0.5%
Asia Pacific	31	32	40	42	48	55	59	54	61	67	76	13.3%	8.8%	6.6%
Total World	765	883	875	858	921	978	1027	1021	1050	1122	1143	1.8%	4.8%	100.0%
of which: OECD	463	560	591	569	579	617	641	657	683	692	681	-1.7%	5.9%	59.6%
Non-OECD	302	323	283	290	342	361	386	363	367	430	462	7.5%	3.3%	40.4%
European Union	30	36	41	47	51	52	57	53	56	57	55	-3.8%	8.6%	4.8%
Biodiesel														
Canada & Mexico	2	2	2	2	2	4	5	6	7	6	7	22.0%	15.7%	1.0%
US	29	19	54	55	76	71	70	87	89	104	96	-7.2%	10.6%	13.8%
Brazil	24	35	39	40	43	50	58	56	63	79	87	10.3%	16.5%	12.4%
Other S. & Cent. America	22	37	48	49	43	53	40	54	57	52	47	-9.8%	15.8%	6.8%
Europe	149	168	160	171	184	209	207	204	232	246	240	-2.4%	7.4%	34.3%
CIS	†	†	†	†	†	†	†	†	†	†	†	–	12.1%	0.1%
Middle East	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Africa	–	–	–	†	†	†	1	2	2	3	3	19.5%	–	0.5%
Asia Pacific	34	37	71	91	111	138	102	130	130	176	218	24.0%	18.0%	31.2%
Total World	260	300	375	409	460	526	483	539	581	665	699	5.1%	11.6%	100.0%
of which: OECD	183	195	220	234	267	291	288	304	333	359	347	-3.4%	8.3%	49.6%
Non-OECD	77	105	155	175	193	236	195	235	248	306	352	15.0%	17.6%	50.4%
European Union	148	168	159	169	183	209	205	202	229	242	236	-2.6%	7.3%	33.7%

Source: includes data from F.O. Licht; US Energy Information Administration (March 2020).

*Includes biogasoline (such as ethanol) and biodiesel. Volumes have been adjusted for energy content.

†Less than 0.5.

♦Less than 0.05%.

Annual changes and shares of total are calculated using thousand barrels a day oil equivalent figures.

Renewables: Biofuels consumption*

Thousand barrels of oil equivalent per day	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Growth rate per annum		Share 2019	
												2019	2008-18		
Canada	15	16	25	29	33	34	34	34	35	37	38	2.1%	10.5%	2.1%	
Mexico	2	2	2	2	2	3	3	4	4	4	4	1.4%	8.4%	0.2%	
US	438	504	541	539	583	591	615	661	662	655	655	-0.1%	5.5%	36.9%	
Total North America	456	522	567	570	618	629	651	699	701	696	696	0.1%	5.7%	39.2%	
Argentina	-	10	14	17	19	23	25	26	30	29	30	2.1%	n/a	1.7%	
Brazil	253	269	246	232	273	301	357	324	341	395	437	10.6%	5.6%	24.6%	
Colombia	†	†	1	1	1	1	1	1	1	1	1	2.8%	11.5%	♦	
Other S. & Cent. America	9	11	12	14	15	16	17	17	18	18	19	4.7%	8.8%	1.1%	
Total S. & Cent. America	262	290	272	264	308	340	399	368	389	443	486	9.8%	6.4%	27.4%	
Austria	10	10	10	10	8	10	12	10	9	9	10	1.4%	1.9%	0.5%	
Belgium	2	7	7	7	6	8	5	8	9	9	9	♦	n/a	0.5%	
Finland	2	2	4	4	4	8	8	3	7	6	6	-1.4%	15.8%	0.3%	
France	45	44	44	48	49	53	53	53	54	53	56	4.5%	2.3%	3.1%	
Germany	51	52	54	57	51	54	50	50	51	54	54	0.1%	0.4%	3.0%	
Italy	21	26	25	28	24	20	25	25	25	26	15	-42.6%	7.2%	0.8%	
Netherlands	7	4	6	6	6	7	6	5	8	12	14	15.8%	8.0%	0.8%	
Poland	12	12	13	14	14	13	12	8	11	17	18	6.7%	7.6%	1.0%	
Portugal	4	6	6	5	5	5	7	5	5	5	5	-1.4%	7.5%	0.3%	
Spain	6	27	32	39	17	18	19	21	25	32	25	-22.1%	23.6%	1.4%	
Sweden	6	9	11	12	12	16	19	25	28	27	28	3.3%	15.8%	1.6%	
United Kingdom	19	22	20	17	20	22	18	18	18	24	31	27.4%	5.0%	1.8%	
Other Europe	19	23	27	31	38	37	37	43	50	53	56	6.1%	12.8%	3.1%	
Total Europe	205	244	258	279	255	272	272	276	300	327	325	-0.5%	6.6%	18.3%	
Total CIS	†	†	†	†	†	†	†	†	†	†	†	†	0.5%	12.7%	♦
Total Middle East	†	†	†	†	†	†	†	†	†	†	†	†	1.7%	-4.0%	♦
Total Africa	†	†	†	†	†	†	1	1	1	1	2	19.1%	59.1%	0.1%	
Australia	20	31	33	29	28	26	24	20	23	26	25	-2.3%	6.3%	1.4%	
China	29	29	34	39	46	61	36	42	43	50	44	-10.4%	6.5%	2.5%	
India	†	†	1	1	1	1	2	3	2	2	2	-0.5%	6.6%	0.1%	
Indonesia	3	3	5	10	15	27	13	44	38	55	111	102.0%	57.1%	6.3%	
South Korea	5	7	6	7	7	7	8	8	8	13	13	0.7%	14.4%	0.7%	
Thailand	12	13	14	18	23	28	31	32	35	38	45	16.9%	15.4%	2.5%	
Other Asia Pacific	4	9	10	12	15	19	23	25	26	26	26	1.7%	29.1%	1.5%	
Total Asia Pacific	74	91	103	116	135	170	138	174	175	209	267	27.5%	14.0%	15.0%	
Total World	997	1148	1201	1229	1317	1412	1463	1518	1567	1676	1776	6.0%	6.8%	100.0%	
of which: OECD	683	805	864	883	905	934	957	1003	1032	1060	1056	-0.4%	6.1%	59.4%	
Non-OECD	314	343	337	346	412	477	506	515	535	617	720	16.8%	8.2%	40.6%	
European Union	203	241	255	274	244	266	266	265	284	313	311	-0.7%	6.2%	17.5%	
Biofuels consumption by fuel type															
Biogasoline															
US	420	490	491	489	503	512	531	545	552	549	554	0.8%	4.1%	49.4%	
Canada & Mexico	16	16	22	26	29	32	32	33	33	35	36	3.3%	9.0%	3.2%	
Brazil	230	234	208	191	230	251	299	268	277	316	349	10.5%	4.0%	31.1%	
Other S. & Cent. America	7	9	10	12	15	17	19	21	23	24	24	3.3%	14.4%	2.2%	
Europe	45	56	58	58	55	55	56	54	57	59	64	8.8%	4.7%	5.7%	
CIS	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	-	
Middle East	†	†	†	†	†	†	†	†	†	†	†	1.7%	-4.0%	♦	
Africa	†	†	†	†	†	†	†	†	†	†	†	4.3%	19.2%	♦	
Asia Pacific	48	61	66	66	73	77	77	86	95	94	94	-0.2%	9.8%	8.4%	
Total World	766	867	857	843	905	945	1015	1007	1037	1077	1122	4.1%	4.8%	100.0%	
of which: OECD	502	596	606	604	616	627	646	657	670	673	682	1.3%	4.5%	60.8%	
Non-OECD	264	271	250	240	289	318	369	350	367	404	439	8.8%	5.2%	39.2%	
European Union	45	56	58	58	53	53	54	51	54	56	61	9.2%	4.2%	5.4%	
Biodiesel															
US	18	15	49	50	80	79	83	116	111	106	101	-4.5%	20.1%	15.4%	
Canada & Mexico	1	2	4	5	5	6	4	5	6	6	5	-5.7%	27.7%	0.8%	
Brazil	23	35	38	40	43	50	58	56	63	79	87	11.0%	16.9%	13.3%	
Other S. & Cent. America	3	12	16	20	20	22	23	23	25	24	25	2.9%	29.1%	3.8%	
Europe	160	187	200	220	200	217	217	222	243	268	261	-2.6%	7.0%	39.9%	
CIS	†	1	1	1	†	†	†	†	†	†	†	0.5%	12.7%	0.1%	
Middle East	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	-	
Africa	-	-	-	-	-	†	1	1	1	1	1	20.0%	n/a	0.2%	
Asia Pacific	26	30	36	49	63	93	61	89	80	115	173	50.1%	19.4%	26.4%	
Total World	231	281	344	386	412	467	448	511	530	599	655	9.2%	12.1%	100.0%	
of which: OECD	181	210	258	280	289	307	311	346	362	386	374	-3.3%	9.6%	57.1%	
Non-OECD	50	72	86	106	122	159	137	165	168	213	281	31.9%	19.3%	42.9%	
European Union	158	185	197	216	191	213	212	214	230	257	250	-2.8%	6.7%	38.1%	

*Includes biogasoline (such as ethanol) and biodiesel. Volumes have been adjusted for energy content.

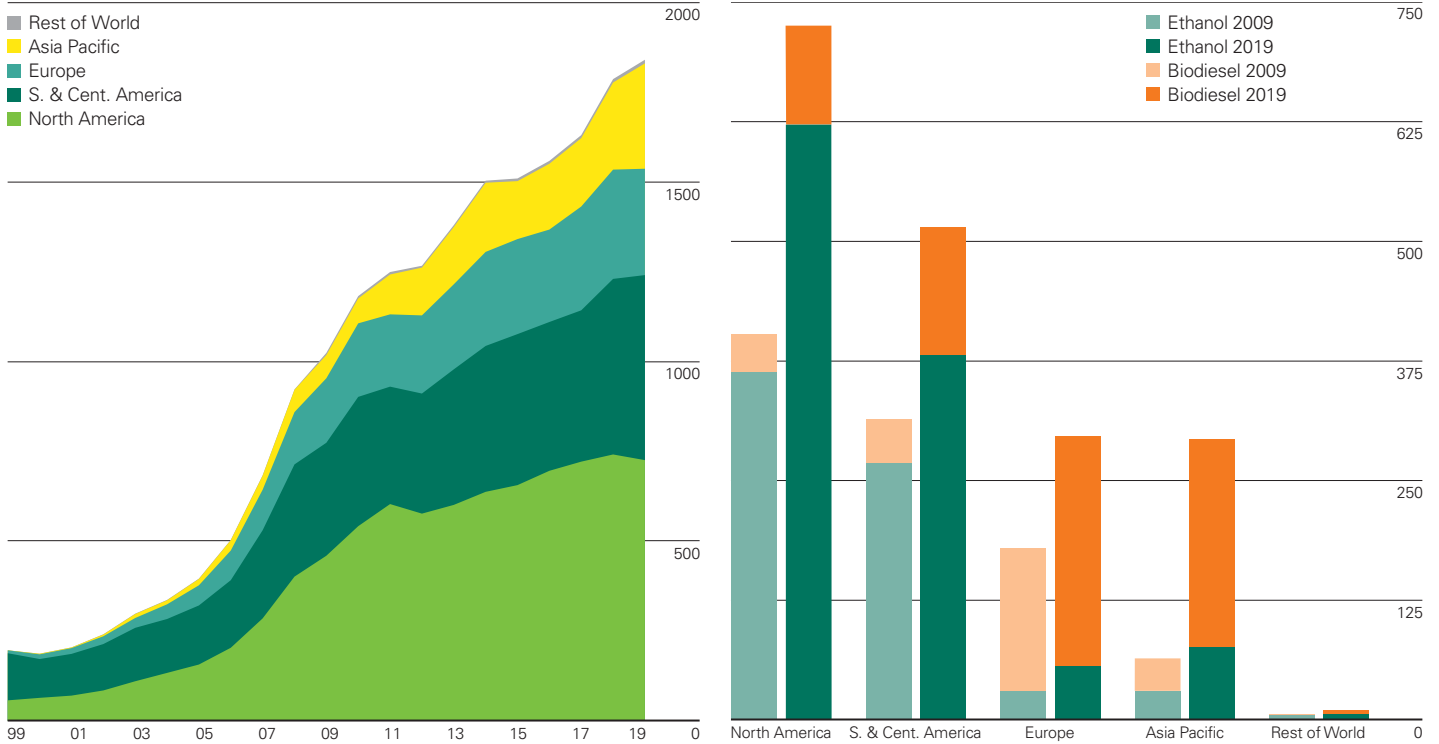
†Less than 0.5.

♦Less than 0.05%.

Annual changes and shares of total are calculated using thousand barrels of oil equivalent per day figures.

World biofuels production

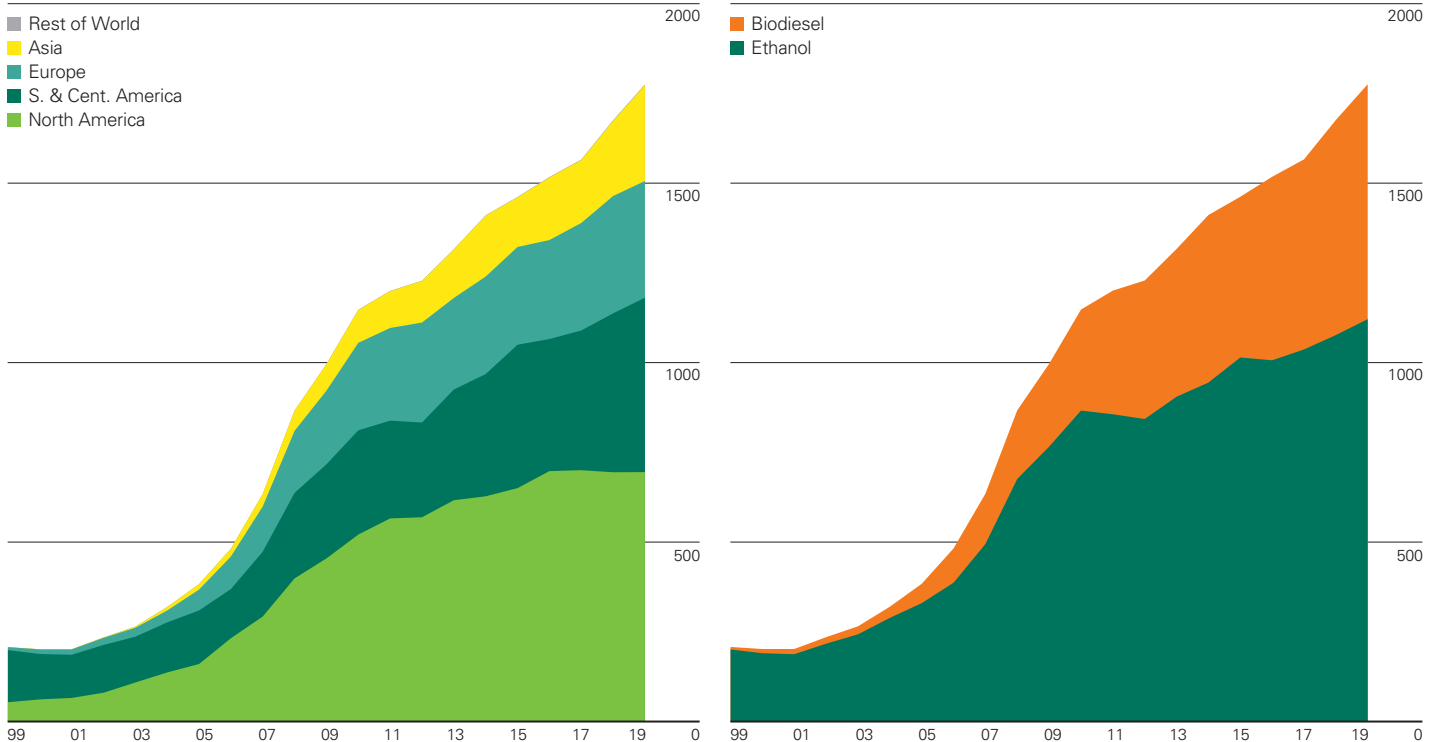
Thousand barrels of oil equivalent per day



Biofuels production growth averaged 3% (54,000 barrels of oil equivalent per day or boe/d, less than half the 10-year average). Growth was led by Brazil (31,000 boe/d) and Indonesia (32,000 boe/d) but US output declined by 19,000 boe/d. Growth was weighted towards biodiesel, which grew by 34,000 boe/d driven largely by Indonesia. Biodiesel is the dominant fuel in Europe and Asia Pacific (making up 81% and 74% of biofuels respectively in 2019), while ethanol is the main fuel in North America (86% of total) and S&C America (74%).

World biofuels consumption

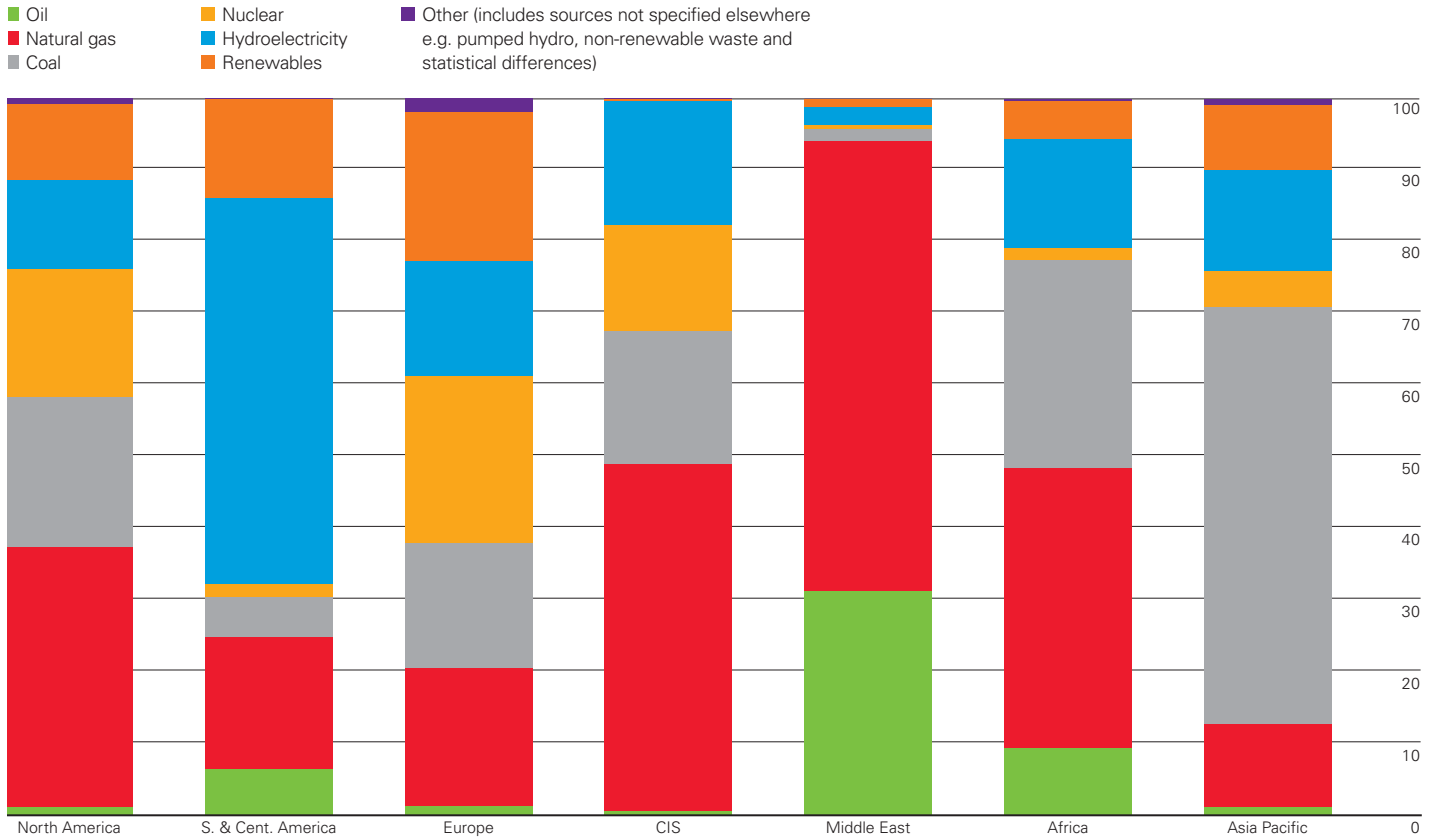
Thousand barrels of oil equivalent per day



Biofuels consumption rose by 6% (100,000 boe/d). As with production, growth was driven mainly by Brazil (42,000 boe/d), most of which was ethanol and Indonesia (56,000 boe/d), which was largely biodiesel. At the global level, ethanol made up 63% of biofuels in 2019, but the share of biodiesel has risen continually. For example, biodiesel's share was 23% in 2009 but rose to 37% last year.

Regional electricity generation by fuel 2019

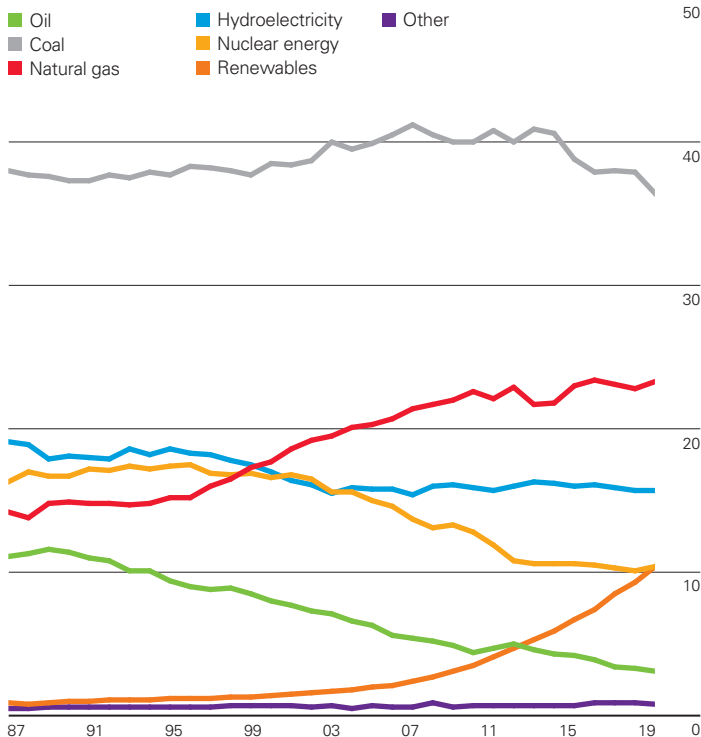
Percentage



Natural gas is the dominant fuel used for power generation in North America, CIS, the Middle East and Africa. South and Central America gets more than half of its power from hydroelectricity, with a share far higher than any other region. In Asia, coal is the dominant fuel. In Europe, nuclear energy is the top source of electricity, but only just, as generation is spread fairly evenly between five different fuels: the shares of nuclear, coal, natural gas, renewables and hydro are all in a narrow range of 16-23%.

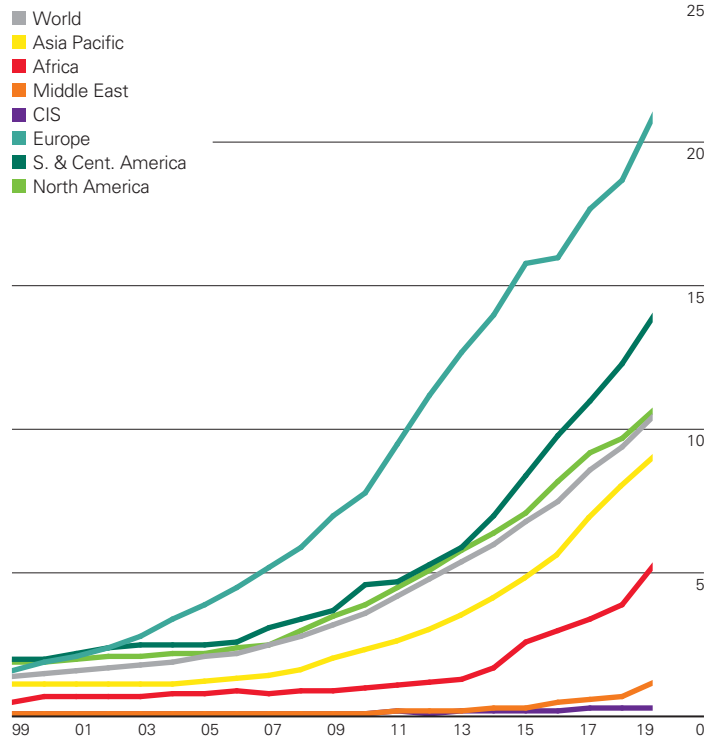
Share of global electricity generation by fuel

Percentage



Renewables share of power generation by region

Percentage



At the global level, coal is the dominant fuel for power generation, however its share fell 1.5 percentage points to 36.4% in 2019, the lowest level in our data series. The shares of both natural gas and renewables rose to record levels last year (to 23.3% and 10.4% respectively) and renewables generation surpassed nuclear for the first time. Regionally, there is significant variation in the penetration of renewables: Europe has the highest penetration at 20.9% – twice the global average, followed by South & Central America at 13.9%.

Electricity generation by fuel*

Terawatt-hours	2018								2019							
	Oil	Natural Gas	Coal	Nuclear energy	Hydro electric	Renew-ables	Other‡	Total	Oil	Natural Gas	Coal	Nuclear energy	Hydro electric	Renew-ables	Other‡	Total
Canada	3.8	64.1	50.6	100.0	385.9	47.1	0.7	652.3	4.1	69.3	54.6	100.5	382.0	49.3	0.7	660.4
Mexico	35.7	194.6	29.0	13.6	32.5	23.3	20.6	349.3	37.7	205.6	26.3	11.3	23.8	37.8	21.6	364.0
US	27.1	1579.3	1246.7	849.6	289.5	451.6	13.6	4457.4	20.0	1700.9	1053.5	852.0	271.2	489.8	14.0	4401.3
Total North America	66.7	1838.0	1326.3	963.2	707.9	522.0	34.9	5459.0	61.8	1975.8	1134.4	963.7	676.9	576.9	36.2	5425.7
Argentina	6.7	84.9	2.1	6.9	41.6	4.0	0.5	146.8	2.8	82.3	0.7	8.4	37.1	8.2	0.5	139.9
Brazil	12.2	54.6	23.7	15.7	389.0	106.3	-	601.4	7.9	58.9	25.7	16.2	399.3	117.7	-	625.6
Other S. & C. America	95.1	104.0	44.6	-	287.6	51.6	-0.1	582.8	75.6	103.8	47.8	-	278.3	58.3	-0.1	563.8
Total S. & C. America	113.9	243.5	70.4	22.5	718.2	161.9	0.5	1331.0	86.3	245.0	74.3	24.6	714.7	184.1	0.4	1329.3
Germany	5.2	82.5	228.2	76.0	18.0	206.8	26.8	643.5	5.1	91.0	171.2	75.1	20.2	224.1	25.7	612.4
Italy	11.0	128.5	31.0	-	47.1	65.6	6.5	289.7	10.2	126.5	29.7	-	45.1	67.6	4.7	283.8
Netherlands	1.3	57.7	27.5	3.5	0.1	18.8	5.6	114.5	1.4	71.0	17.4	3.9	0.1	22.3	5.0	121.0
Poland	1.8	12.6	133.3	-	2.0	19.6	0.7	170.0	1.2	14.8	121.9	-	2.0	23.1	1.0	163.9
Spain	14.5	58.0	38.7	55.8	34.8	69.8	2.9	274.5	13.4	86.0	13.1	58.4	25.2	77.5	2.1	275.8
Turkey	0.3	92.5	113.2	-	59.9	37.8	1.0	304.8	0.2	58.1	114.6	-	89.2	45.3	1.1	308.5
Ukraine	0.7	9.0	52.1	84.4	10.4	2.5	0.7	159.9	0.2	9.2	48.3	83.0	6.8	5.0	1.9	154.5
United Kingdom	1.7	131.5	16.8	65.1	5.5	104.5	7.8	332.9	1.0	132.5	6.9	56.2	6.0	113.4	7.8	323.7
Other Europe	19.5	157.5	215.8	651.1	467.5	230.8	35.2	1777.5	19.0	179.1	175.6	651.9	438.0	258.3	27.9	1749.7
Total Europe	56.1	729.9	856.6	935.8	645.3	756.3	87.1	4067.2	51.8	768.1	698.6	928.5	632.5	836.6	77.2	3993.3
Kazakhstan	0.8	20.7	79.6	-	10.4	0.5	-4.7	107.3	0.8	20.8	78.1	-	10.0	0.8	-2.1	108.4
Russian Federation	6.8	511.1	190.3	204.6	190.6	1.4	4.4	1109.2	6.9	519.5	182.2	209.0	194.4	1.8	4.3	1118.1
Other CIS	0.9	148.6	4.1	2.1	43.3	0.6	0.3	199.9	0.9	152.7	4.0	2.2	44.0	0.7	0.1	204.5
Total CIS	8.5	680.4	274.0	206.7	244.3	2.5	†	1416.3	8.6	693.0	264.2	211.2	248.4	3.3	2.3	1431.0
Iran	86.0	209.0	0.6	6.9	11.4	0.5	-	314.4	82.6	199.5	0.6	6.4	29.0	0.6	-	318.7
Saudi Arabia	158.8	200.0	-	-	-	0.4	-	359.2	149.6	206.0	-	-	-	1.8	-	357.4
United Arab Emirates	†	134.7	-	-	-	1.3	-	136.0	†	133.9	-	-	-	4.2	-	138.1
Other Middle East	147.5	238.0	20.6	-	3.1	5.3	-	414.5	163.9	253.5	21.9	-	4.3	6.8	-	450.5
Total Middle East	392.3	781.6	21.3	6.9	14.5	7.5	-	1224.1	396.1	792.9	22.6	6.4	33.3	13.3	-	1264.7
Egypt	28.8	153.7	-	-	13.4	3.5	-	199.4	28.2	152.5	-	-	13.4	6.5	-	200.6
South Africa	1.2	1.9	224.6	11.1	0.8	12.3	4.6	256.3	1.2	1.9	217.3	14.2	0.8	12.6	4.6	252.6
Other Africa	49.3	175.8	32.0	-	116.3	16.4	0.3	390.1	51.9	186.1	36.2	-	118.6	26.0	-1.8	417.0
Total Africa	79.3	331.3	256.6	11.1	130.4	32.2	4.9	845.8	81.3	340.5	253.6	14.2	132.7	45.1	2.8	870.1
Australia	5.4	51.4	156.5	-	17.4	32.2	0.1	263.1	5.8	54.4	149.5	-	14.3	41.1	0.1	265.1
China	5.5	215.5	4765.0	295.0	1198.9	636.4	49.8	7166.1	6.0	236.5	4853.7	348.7	1269.7	732.3	56.5	7503.4
India	8.5	73.9	1167.3	39.1	139.6	122.8	0.2	1551.4	8.2	71.0	1137.4	45.2	161.8	134.9	0.2	1558.7
Indonesia	18.1	57.3	160.0	-	16.8	14.6	0.3	267.1	17.3	51.6	177.0	-	17.0	16.0	0.3	279.1
Japan	66.2	386.9	323.0	49.1	81.0	96.8	53.3	1056.2	44.7	362.4	326.2	65.6	73.9	121.2	42.3	1036.3
Malaysia	1.3	64.8	73.5	-	26.5	1.3	-	167.3	2.6	68.6	71.1	-	27.0	1.7	-	171.0
South Korea	10.1	160.9	250.9	133.5	3.4	23.9	10.7	593.4	7.4	150.8	238.7	146.0	2.8	29.2	9.7	584.7
Taiwan	8.2	92.4	131.2	27.7	4.5	6.4	5.2	275.6	5.8	91.1	126.4	32.3	5.5	8.0	5.0	274.2
Thailand	0.2	116.3	35.8	-	7.6	17.8	†	177.6	1.1	121.8	35.8	-	6.3	21.4	†	186.5
Vietnam	0.2	40.1	83.9	-	84.5	0.5	-	209.2	1.4	43.1	112.5	-	65.6	4.7	-	227.4
Other Asia Pacific	49.9	218.2	138.9	9.8	130.8	32.8	1.9	582.2	39.1	231.4	148.0	9.5	139.7	35.7	0.5	604.0
Total Asia Pacific	173.5	1477.7	7286.1	554.1	1710.9	985.5	121.5	12309.3	139.5	1482.6	7376.4	647.3	1783.7	1146.2	114.8	12690.5
Total World	890.4	6082.5	10091.3	2700.4	4171.4	2468.0	248.9	26652.7	825.3	6297.9	9824.1	2796.0	4222.2	2805.5	233.6	27004.7
of which: OECD	196.4	3201.2	2829.6	1969.8	1423.0	1442.4	183.9	11246.1	164.9	3347.5	2471.0	1993.0	1380.2	1616.8	162.6	11136.0
Non-OECD	694.0	2881.3	7261.7	730.6	2748.4	1025.6	65.0	15406.6	660.4	2950.4	7353.1	803.0	2842.1	1188.8	71.0	15868.7
EU	52.6	621.2	643.6	827.0	346.9	700.9	77.9	3270.1	49.1	692.2	488.4	822.4	327.9	768.2	67.2	3215.3

*Based on gross output.

‡Includes sources not specified elsewhere e.g. pumped hydro, non-renewable waste and statistical discrepancies (which can be positive or negative).

†Less than 0.05.

Reserves of key minerals

Cobalt reserves

Thousand tonnes	At end of 2019	Share	R/P ratio
Australia	1200	17.8%	234
Canada	230	3.4%	69
Democratic Republic of Congo	3600	53.3%	46
Cuba	500	7.4%	107
Madagascar	120	1.8%	36
Morocco	18	0.3%	9
New Caledonia	64	0.9%	52
Papua New Guinea	56	0.8%	18
Philippines	260	3.9%	56
Russian Federation	250	3.7%	41
South Africa	50	0.7%	21
Zambia	270	4.0%	213
Rest of World*	135	2.0%	21
Total World	6753	100.0%	55

Natural graphite reserves

Thousand tonnes	At end of 2019	Share	R/P ratio
Brazil	72000	22.8%	750
Canada	n/a	n/a	n/a
China	73000	23.1%	104
India	8000	2.5%	229
Madagascar	1600	0.5%	33
Mexico	3100	1.0%	738
Mozambique	25000	7.9%	163
Russian Federation	14800	4.7%	892
Sri Lanka	n/a	n/a	n/a
Ukraine	n/a	n/a	n/a
Zimbabwe	n/a	n/a	n/a
Rest of World*	118200	37.4%	2440
Total World	315700	100.0%	272

Lithium reserves

Thousand tonnes	At end of 2019	Share	R/P ratio
Argentina	1700	11.0%	266
Australia	2800	18.1%	69
Brazil	95	0.6%	317
Chile	8600	55.5%	519
China	1000	6.5%	133
Portugal	60	0.4%	50
US	630	4.1%	700
Zimbabwe	230	1.5%	144
Rest of World*	370	2.4%	206
Total World	15485	100%	201

Rare earth metals reserves

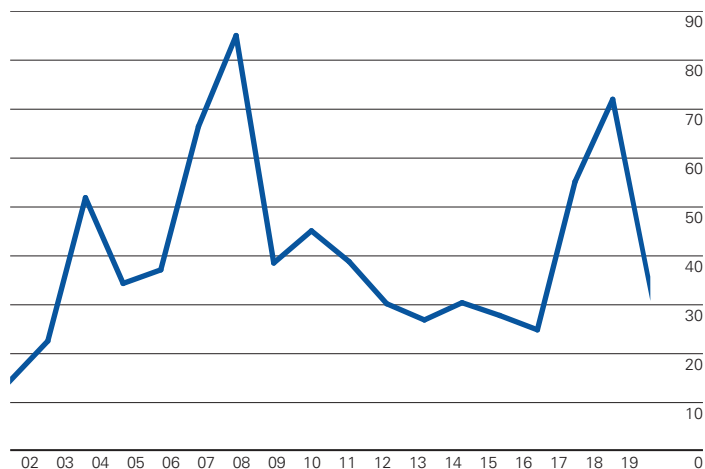
Thousand tonnes	At end of 2019	Share	R/P ratio
Australia	3300	2.7%	187
Brazil	22000	17.7%	22000
China	44000	35.4%	333
India	6900	5.5%	2300
Malaysia	30	♦	349
Russian Federation	20695	16.6%	7960
Thailand	890	0.7%	n/a
US	1400	1.1%	54
Rest of World*	25120	20.2%	920
Total World	124335	100.0%	593

*Rest of World is the sum of only recorded reserves.
 ♦Less than 0.05%.
 n/a not available.

Source (for all tables): includes data from US Geological Survey.

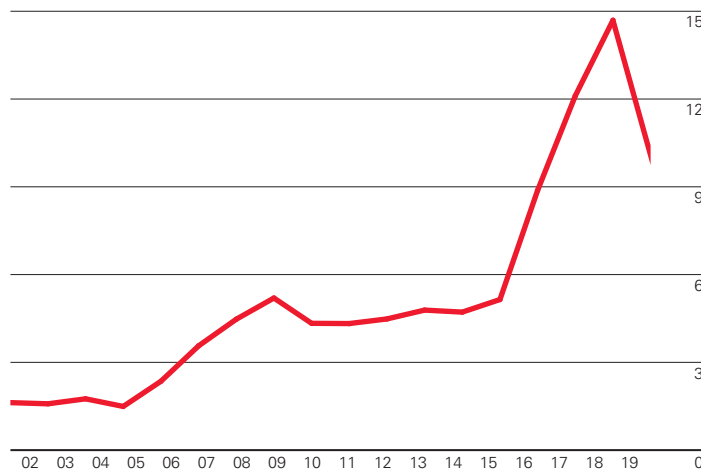
Cobalt prices

Thousands of US dollars per tonne*



Lithium carbonate prices

Thousands of US dollars per tonne†



*2000-2012 spot grade for cathodes, source US Geological Survey. Data from 2013 onwards: min purity 99.8%, source London Metal Exchange.

†2000-2008 unit value, data series 140, source US Geological Survey. Data from 2009 onwards: FOB South America, source Benchmark Mineral Intelligence.

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	tonnes to gigajoules	tonnes to barrels oil equivalent
	Multiply by					
Ethane	0.059	16.850	0.373	2.679	49.400	8.073
Liquefied petroleum gas (LPG)	0.086	11.600	0.541	1.849	46.150	7.542
Gasoline	0.120	8.350	0.753	1.328	44.750	7.313
Kerosene	0.127	7.880	0.798	1.253	43.920	7.177
Gas oil/diesel	0.134	7.460	0.843	1.186	43.380	7.089
Residual fuel oil	0.157	6.350	0.991	1.010	41.570	6.793
Product basket	0.124	8.058	0.781	1.281	43.076	7.039

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

From	To						
	billion cubic metres NG	billion cubic feet NG	petajoules NG	million toe	million tonnes LNG	trillion Btu	million boe
	Multiply by						
1 billion m ³ NG	1.000	35.315	36.000	0.860	0.735	34.121	5.883
1 billion ft ³ NG	0.028	1.000	1.019	0.024	0.021	0.966	0.167
1 petajoule NG	0.028	0.981	1.000	0.024	0.021	0.952	0.164
1 million toe	1.163	41.071	41.868	1.000	0.855	39.683	6.842
1 million tonnes LNG	1.360	48.028	48.747	1.169	1.000	46.405	8.001
1 trillion Btu	0.029	1.035	1.050	0.025	0.022	1.000	0.172
1 million boe	0.170	6.003	6.093	0.146	0.125	5.800	1.000

Methodology

Methodology for converting non-fossil electricity generation to primary energy

Primary energy consumption numbers for non-fossil based electricity (nuclear, hydro, wind, solar, geothermal, biomass in power and other renewables sources) are calculated on an 'input-equivalent' basis – i.e. based on the equivalent amount of fossil fuel input required to generate that amount of electricity in a standard thermal power plant.

From this review onwards, the thermal efficiency assumption for the standard power plant is time varying, based on a simplified representation of measured average efficiency levels:

1965-2000: assumed constant efficiency of 36%

2000-2017: a linear increase from 36% to 40% based on observed data

2018 onwards: the annual rate of efficiency improvement is based on the simplified assumption that efficiency will increase linearly to 45% by 2050.

The table below quantifies these assumptions:

Thermal equivalent efficiency factors used to convert non-fossil electricity to primary energy

Year(s)	Efficiency factor	Year(s)	Efficiency factor
1965-2000	36%	2010	38.4%
2001	36.2%	2011	38.6%
2002	36.5%	2012	38.8%
2003	36.7%	2013	39.1%
2004	36.9%	2014	39.3%
2005	37.2%	2015	39.5%
2006	37.4%	2016	39.8%
2007	37.6%	2017	40.0%
2008	37.9%	2018	40.2%
2009	38.1%	2019	40.4%

For more details on the change in methodology please go to using the review at bp.com/statisticalreview.

Units

1 metric tonne	= 2204.62lb = 1.1023 short tons
1 kilolitre	= 6.2898 barrels = 1 cubic metre
1 kilocalorie (kcal)	= 4.1868kJ = 3.968Btu
1 kilojoule (kJ)	= 1,000 joules = 0.239 kcal = 0.948 Btu
1 petajoule (PJ)	= 1 quadrillion joules (1 x 10 ¹⁵)
1 exajoule (EJ)	= 1 quintillion joules (1 x 10 ¹⁸)
1 British thermal unit (Btu)	= 0.252kcal = 1.055kJ
1 tonne of oil equivalent (toe)	= 39.683 million Btu = 41.868 million kJ
1 barrel of oil equivalent (boe)	= 5.8 million Btu = 6.119 million kJ
1 kilowatt-hour (kWh)	= 860kcal = 3600kJ = 3412Btu

Calorific equivalents

One exajoule equals approximately:

Heat units	239 trillion kilocalories 948 trillion Btu
Solid fuels	40 million tonnes of hard coal 95 million tonnes of lignite and sub-bituminous coal
Gaseous fuels	See Natural gas and LNG table
Electricity	278 terawatt-hours

All fuel energy content is net or lower heating value (i.e., net of heat of vaporisation of water generated from combustion).

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

Primary energy consumption is reported in net terms. The gross calorific value to net calorific value adjustment is fuel specific.

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.

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, regions 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), Bermuda, Central and South America.

Europe

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

Commonwealth of Independent States (CIS)

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

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.

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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.

[†]Mainland China.

*Special Administrative Region.

Australasia

Australia, New Zealand.

OECD members

Europe: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, 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, Saudi Arabia, United Arab Emirates.

North Africa: Algeria, Libya.

West Africa: Angola, Equatorial Guinea, Gabon, Nigeria, Republic of Congo.

South America: Ecuador, Venezuela.

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.

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All countries that are not members of the OECD.

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