



Statistical Review of World Energy

2021 | 70th edition



Reviewing world energy
data for 70 years

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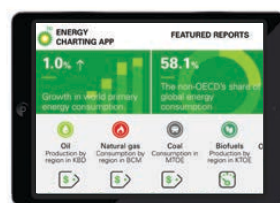
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Chief executive officer's introduction



2020 will forever be remembered as the year COVID-19 turned our daily lives upside down.

Above all, this is a human tragedy. At the time of writing, around four million people are estimated to have died due to COVID-19. The true number is almost certainly far higher, and it continues to rise.

The combination of the pandemic and the actions taken to limit its impact led to the largest recession in modern peacetime, with that loss falling disproportionately on those in the world's poorest and least-developed countries. The economic scars from the pandemic will likely persist for years to come. And, of course, the pandemic and resulting economic turmoil spilled over into unparalleled volatility and disruption in global energy markets.

“ Companies that are committed to ‘greening’ have a hugely significant part to play in achieving the Paris goals. ”

This year's 70th edition of the bp Statistical Review provides all of us with the objective and timely data needed to help make sense of the most tumultuous events affecting energy markets in any of the past seven decades.

Energy in 2020

Global energy demand is estimated to have fallen by 4.5% in 2020. This is the largest recession since the end of World War II, driven by an unprecedented collapse in oil demand, as the imposition of lockdowns around the world decimated transport-related demand. The drop in oil consumption accounted for around three-quarters of the total decline in energy demand. Natural gas showed greater resilience, helped primarily by continuing strong growth in China.

Despite the disorder of 2020, renewable energy, led by wind and solar energy, continued to grow prolifically. Remarkably, wind and solar capacity increased by a colossal 238 GW last year – 50% larger than any previous expansion. Likewise, the share of wind and solar generation in the global power mix recorded its largest ever increase. The relative immunity of renewable energy to the events of last year is encouraging.

The fall in carbon emissions from energy use was equally striking, with emissions falling by over 6% in 2020 – again, the largest decline since 1945. Although unmatched in modern peacetime, the rate of decline in carbon emissions last year is similar to what the world needs to average each year for the next 30 years to be on track to meet the aims of the Paris Agreement.

Not just green but greening

There are worrying signs that last year's COVID-induced dip in carbon emissions will be short lived as the world economy recovers and lockdowns are lifted. The challenge is to achieve sustained, comparable year-on-year reductions in emissions without massive disruption to our livelihoods and our everyday lives.

Since the Paris Conference of Parties (COP21) in 2015 there has been a huge increase in countries' ambitions to decarbonize. Around 70% of the world's carbon emissions are now covered by net zero targets and pledges. But this rising ambition has yet to be translated into a decisive reduction in emissions. The next big staging post for that challenge will occur later this year in Glasgow, Scotland which will host COP26 – arguably the most important UN climate change conference since the Paris meeting. I hope that, in years to come, we all talk about the Glasgow Agreement with the same importance and reverence as we do the Paris goals.

I sincerely believe that companies like bp with net zero ambitions, coherent plans, and near, medium, and long-term aims – companies that are committed to ‘greening’ – have a hugely significant part to play in achieving the Paris goals. Yes, the world needs more low carbon companies. But maybe more than anything, it also needs existing energy companies to decarbonize and in so doing use their scale and expertise to help bring about the deep and complex rewiring and replumbing of the global energy system that the world wants and needs to see over the next 30 years.

It will take producers and consumers, as well as companies, governments, and society, all working together to bring about the necessary change.

100th anniversary of the Statistical Review

In 30 years, the Statistical Review will celebrate its 100th anniversary reporting and analyzing energy developments in 2050, a year which has become the focal point for so many net zero ambitions and aims. What events and developments will our successors be able to look back on in 30 years' time? Did the world respond quickly and decisively enough to reduce the impacts of climate change?

We at bp are committed to playing our role. And I hope this year's Statistical Review will be useful to everyone pursuing a similar transition. The Review would not be possible without the continuing co-operation and transparency of governments and statistical agencies around the world who each year contribute their official data, and the bp team who make it so accessible and useful. You have my heartfelt thanks. And as ever, Spencer Dale and the team welcome any feedback you might have.

A handwritten signature in black ink that reads "Bernard Looney".

Bernard Looney
Chief executive officer
July 2021

2020 at a glance

The COVID-19 pandemic had a dramatic impact on energy markets, with both primary energy and carbon emissions falling at their fastest rates since the Second World War. Nevertheless, renewable energy continued to grow, with solar power recording its largest ever increase.

Energy developments

- Primary energy consumption fell by 4.5% in 2020 – the largest decline since 1945.
- The drop in energy consumption was driven mainly by oil, which contributed almost three-quarters of the net decline, although natural gas and coal also saw significant declines.
- Wind, solar and hydroelectricity all grew despite the fall in overall energy demand.
- By country, the US, India and Russia contributed the largest declines in energy consumption. China posted the largest increase (2.1%), one of only a handful of countries where energy demand grew last year.

Carbon emissions

- Carbon emissions from energy use fell by 6.3%, to their lowest level since 2011. As with primary energy, this was the largest decline since the end of World War II.

Oil

- The oil price (Dated Brent) averaged \$41.84/bbl in 2020 – the lowest since 2004.
- Oil consumption fell by a record 9.1 million barrels per day (b/d), or 9.3%, to its lowest level since 2011.
- Oil demand fell most in the US (-2.3 million b/d), the EU (-1.5 million b/d) and India (-480,000 b/d). China was virtually the only country where consumption increased (220,000 b/d).
- Global oil production shrank by 6.6 million b/d, with OPEC accounting for two-thirds of the decline. Libya (-920,000 b/d) and Saudi Arabia (-790,000 b/d) saw the largest OPEC declines, while Russia (-1.0 million b/d) and the US (-600,000 b/d) led non-OPEC reductions.
- Refinery utilization fell by a record 8.0 percentage points to 74.1%, the lowest level since 1985.

-4.5% and -6.3%

Decline in global primary energy consumption and carbon emissions, the largest falls since 1945



Natural gas

- Natural gas prices declined to multi-year lows: US Henry Hub averaged \$1.99/mmBtu in 2020 – the lowest since 1995, while Asian LNG prices (Japan Korea Marker) registered their lowest level on record (\$4.39/mmBtu).
- Natural gas consumption fell by 81 billion cubic metres (bcm), or 2.3%. Nevertheless, the share of gas in primary energy continued to rise, reaching a record high of 24.7%.
- Declines in gas demand were led by Russia (-33 bcm) and the US (-17 bcm), with China (22 bcm) and Iran (10 bcm) contributing the largest increases.
- Inter-regional gas trade reduced by 5.3%, completely accounted for by a 54 bcm (10.9%) drop in pipeline trade.
- LNG supply grew by 4 bcm or 0.6%, well below the 10-year average rate of 6.8% p.a. US LNG supply expanded by 14 bcm (29%), but this was partially offset by declines in most other regions, notably Europe and Africa.

Coal

- Coal consumption fell by 6.2 exajoules (EJ), or 4.2%, led by declines in the US (-2.1 EJ) and India (-1.1 EJ), with OECD coal consumption falling to its lowest level in our data series back to 1965.
- China and Malaysia were notable exceptions, increasing their consumption by 0.5 EJ and 0.2 EJ respectively.
- Global coal production was down 8.3 EJ (5.2%). As with consumption, production growth in China (1.1 EJ) was outweighed by sharp declines in several countries, including the US (-3.6 EJ), Indonesia (-1.3 EJ) and Colombia (-1.0 EJ).

Renewables, hydro and nuclear

- Renewable energy (including biofuels but excluding hydro) rose by 9.7%, slower than the 10-year average (13.4% p.a.) but the increment in energy terms (2.9 EJ) was similar to increases seen in 2017, 2018 and 2019.
- Solar electricity rose by a record 1.3 EJ (20%), however, wind (1.5 EJ) provided the largest contribution to renewables growth.
- Solar capacity expanded by 127 GW, while wind capacity grew 111 GW – almost double its previous highest annual increase.
- China was the largest individual contributor to renewables growth (1.0 EJ), followed by the US (0.4 EJ). Europe, as a region, contributed 0.7 EJ.
- Hydroelectricity grew by 1.0%, again led by China (0.4 EJ), while nuclear energy fell 4.1%, driven mainly by declines in France (-0.4 EJ), the US (-0.2 EJ) and Japan (-0.2 EJ).

Electricity

- Electricity generation fell by 0.9% – more than the decline in 2009 (-0.5%), the only other year in our data series (which starts in 1985) when electricity demand fell.
- The share of renewables in power generation increased from 10.3% to 11.7%, while coal's share fell 1.3 percentage points to 35.1% – a new low in our data series.

Key minerals

- Lithium production fell 4.6% on a drop in Australian output, while Cobalt output rose 2.9% as production in the Democratic Republic of Congo partially recovered from its dip in 2019.
- Rare earth metals production expanded by 23.2%, driven by strong growth in Australia and the US.

Chief economist's analysis



Energy in 2020: the year of COVID

This is the 70th anniversary of the bp *Statistical Review* – something we are incredibly proud of.

Since it was first published in 1952, the *Statistical Review* has provided a constant source of objective, comprehensive – and, most importantly – trusted data to help industry, governments and commentators make sense of developments in global energy markets.

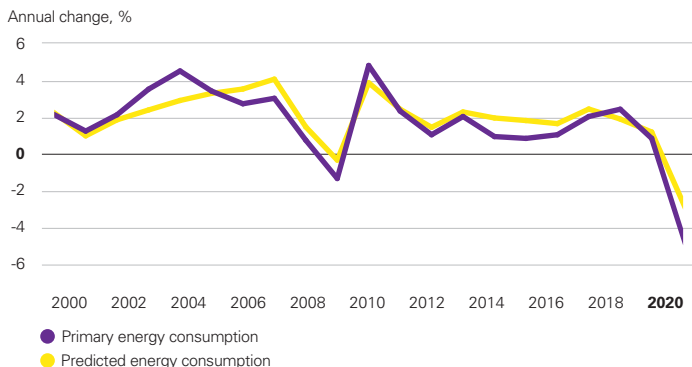
Over those 70 years, the *Statistical Review* has borne witness to some of the most dramatic episodes in the history of the global energy system: the Suez Canal crisis in 1956, the oil embargo of 1973, soon followed by the Iranian revolution in 1979, and more recently, the Fukushima disaster in 2011.

All moments of great turmoil in global energy. But all pale in comparison to the events of last year.

Most importantly, the pandemic that engulfed the world last year is a humanitarian tragedy. As of the beginning of July, close to four million people were reported to have died as a result of COVID-19. The true number is likely to be far higher, and it continues to rise.

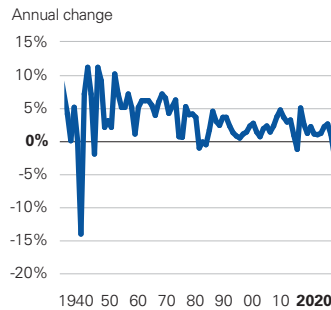
The pandemic also led to huge economic loss. Global GDP is estimated to have fallen by over 3.5% last year – the largest peacetime recession since the Great Depression. The IMF estimate that around 100 million people have been pushed into poverty as a result of the virus. And the economic scarring from the pandemic – especially for the world's poorest and least-

Global energy demand: actual versus predicted

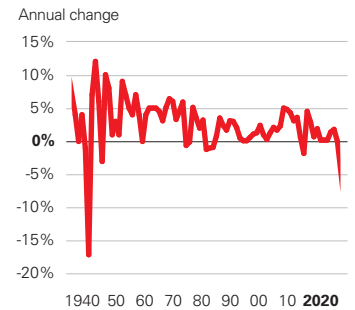


Global energy demand and carbon emissions

Primary energy consumption



CO₂ emissions from energy use



developed economies – is expected to persist for many years after the virus is brought under control. Long COVID can take many different forms.

For the global energy system, the combination of the pandemic, together with efforts to mitigate its impact, led to developments and outturns unmatched in modern peacetime.

For energy, 2020 was a year like no other.

The aim in this analysis is to use the new *Statistical Review* data to try to shed light on those developments, focusing on three key questions.

First, over the past year, we have been bombarded with daily headlines of unprecedented developments and volatility. Standing back from all the noise, what exactly happened last year in the world of energy and how surprising was it?

Second, the global pandemic was the mother of all stress tests. Engineers will tell you that we can learn a lot from how systems behave under extreme pressure. In that spirit, what have we learnt from the response of the global energy system to the COVID-19 crisis?

And finally, this all took place against a backdrop of increasing societal and political demands for an accelerated transition to a net zero energy system. Indeed, Glasgow in Scotland was due to host COP26 last year – arguably the most important UN climate conference since Paris. In the event, the conference had to be delayed until November 2021.

So, as we prepare for Glasgow, what lessons can we draw from the past year – and, more generally, from the developments since Paris – for the challenges and opportunities for this year's COP?

Energy in 2020: what happened and how surprising was it?

Starting first with what actually happened last year and how surprising was it? The headline numbers are dramatic: world energy demand is estimated to have fallen by 4.5% and global carbon emissions from energy use by 6.3%.

These falls are huge by historical standards – the largest falls in both energy demand and carbon emissions since World War II. Indeed, the fall of over 2 Gt of CO₂ means that carbon emissions last year were back to levels last seen in 2011.

It's also striking that the carbon intensity of the energy mix – the average carbon emitted per unit of energy used – fell by 1.8%, also one of the largest ever falls in post-war history.

-2.1 Gt

fall in carbon emissions, taking CO₂ emissions to lowest level since 2011

How should we think about these reductions?

From a historical perspective, the falls in energy demand and carbon emissions are obviously dramatic. But from a forward-looking perspective, the rate of decline in carbon emissions observed last year is similar to what the world needs to average each and every year for the next 30 years to be on track to meet the Paris climate goals.

Put more concretely, if carbon emissions declined at the same average rate as last year for the next 30 years, global carbon emissions would decline by around 85% by 2050. For those of you familiar with bp's latest *Energy Outlook*, that is roughly mid-way between the *Rapid* and *Net Zero* scenarios, which are broadly consistent with maintaining global temperature rises well below 2°C and below 1.5°C respectively.

Last year's fall in carbon emissions was obviously driven by a huge loss in economic output and activity. A simple calculation comparing the fall in emissions with the decline in world output equates to an implied carbon price of almost \$1400/per tonne. Scarily high. The challenge is to reduce emissions without causing massive disruption and damage to everyday lives and livelihoods.

It's interesting to ask how surprising the falls in energy demand and carbon emissions were last year. Yes: they were the biggest falls seen for 75 years, but they occurred against the backdrop of a global pandemic and the largest economic recession in post-war history. So how surprising were they given everything else that was going on?

The yellow 'predicted' line in the global energy demand chart is based on the same simple framework which we used in the 2019 *Statistical Review* to analyse movements in energy demand.

The framework uses GDP growth, changes in oil prices (as a proxy for energy prices), and the number of unusually hot and cold days to predict the growth of energy demand at a country level and then aggregates to global energy¹. The neat thing about the framework is that, despite being embarrassingly simple, it can explain most of the broad contours in energy demand over the past 20 years or so.

The key feature of last year's fall in energy demand is that it was surprisingly big. Even after controlling for the collapse in economic activity, the decline in energy demand was close to twice the size of the 'predicted' fall: 4.5% compared with a predicted fall of around 2.5%. The source of this surprise can be better understood by looking at the size of the falls in the different components of energy demand.

Oil demand is estimated to have fallen by an unprecedented 9.3% (9.1 million barrels/day, or Mb/d) in 2020 – far bigger than anything seen in history and far bigger than the falls in the other demand components. Indeed, the fall in oil demand accounts for around three-quarters of the



-9.3%

decline in oil consumption, the largest in history

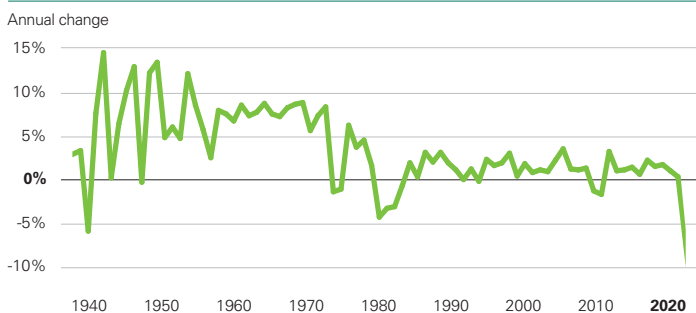
total decline in energy consumption. It's also the key factor accounting for the near-record fall in the carbon intensity of the energy mix.

The yellow bars in the energy demand growth chart use a similar modelling approach to derive predicted movements for each of the demand components. As you can see, the fall in oil consumption in 2020 was far bigger than expected based on past relationships. And the extent of that discrepancy was far greater than for any of the other demand components.

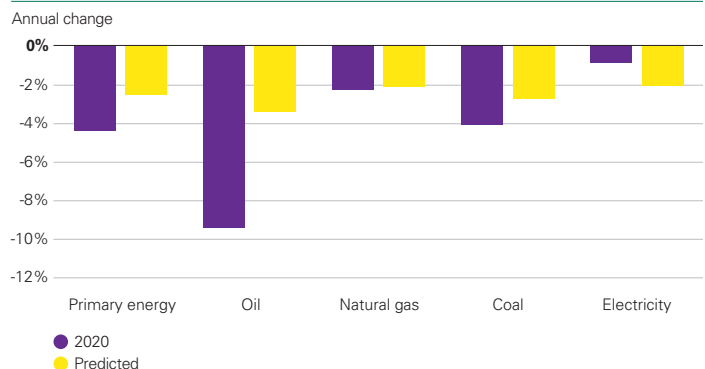
The decline in natural gas was pretty much bang-in-line with the model prediction and electricity consumption actually fell by less than predicted. Indeed, for those of you who like to think in statistical terms, the only statistically significant prediction errors were those for total energy demand and oil demand. And the surprise in total energy demand can be entirely explained by the greater-than-expected fall in oil demand.

Of course, for all of us who experienced extended lockdowns last year, this is hardly surprising. The lockdowns detracted from oil demand in a completely different way to a normal economic downturn, crushing transport-related demand. Mobility metrics fell across the board. Use of jet fuel and kerosene is estimated to have plunged by 40% (3.2 Mb/d) as aviation across much of the world was grounded.

Growth in oil demand



Energy demand growth in 2020



¹ The country-level model for China also includes a variable to capture the industrial composition of GDP growth. For more details, see <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2019-full-report.pdf>



Similarly, gasoline demand fell by around 13% (3.1 Mb/d) as road mobility measures crashed. In contrast, products most closely related to the petrochemicals sector (naphtha, ethane and LPG) were broadly flat, supported in part by increasing demand for PPE and other medical- and hygiene-related supplies.

In comparison, natural gas showed far greater resilience. Gas demand is estimated to have fallen by 2.3% (81 bcm) in 2020, a broadly similar decline to that seen in 2009 in the aftermath of the financial crisis. Consumption fell in most regions, with the notable exception of China, where gas demand grew by almost 7%. The relative immunity of natural gas was helped by sharp falls in gas prices, which allowed gas generation to gain share in the US power market and hold its own in the EU.

Electricity consumption is estimated to have experienced the smallest fall across the main components of final energy demand, declining by just 0.9% in 2020. The relative resilience of electricity usage was aided by the nature of the lockdowns, with falling power demand in industry and commercial buildings partially offset by increased domestic use by home-based workers and locked-down families.

The relative resilience of overall power generation disguises a more significant shift in the generation mix. In particular, despite the fall in overall power demand, generation from renewables (wind, solar, bioenergy and geothermal energy, and excluding hydroelectricity) recorded its largest ever increase (358 TWh). This growth was driven by strong increases in both wind (173 TWh) and solar (148 TWh) generation.

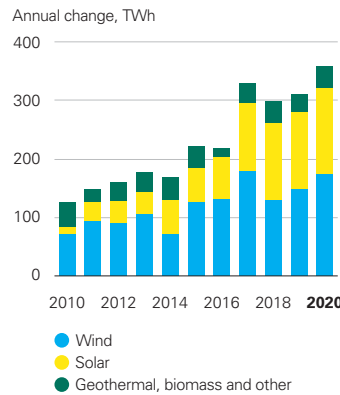
Encouragingly, the share of renewables in global generation recorded its fastest ever increase. That continues the strong growth seen in recent years. Over the past five years, renewable generation has accounted for around 60% of the growth in global power generation, with wind and solar power more than doubling.

The growth in renewables last year came largely at the expense of coal-fired generation, which experienced one of its largest declines on record (405 TWh, 4.4%). In addition to falling power demand and increasing deployment of renewables, coal was also hurt by a loss of competitiveness relative to natural gas, especially in the US and EU.

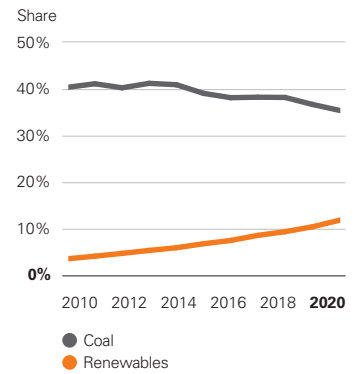
These trends are exactly what the world needs to see as it transitions to net zero: strong growth in renewable generation crowding out coal. That said, the 'more than doubling' in wind and solar generation over the past five years hasn't made even the smallest dent in total coal generation. The level of coal generation in 2020 was essentially unchanged from its level in 2015 as last year's fall simply offset increases from the previous few years. It will take more than just strong growth in renewable energy to remove coal from the global power sector, especially at the pace it

Power generation

Renewable power generation



Share of renewables and coal in global power generation



needs to happen. There is still a long way to go to squeeze coal out of the power sector.

In the developed world, there needs to be greater progress on energy efficiency. And as we highlighted in the 2020 *Energy Outlook*, for many emerging market economies to make significant inroads into the role of coal while still ensuring improving energy access, they will likely need to see an expansion in natural gas alongside renewable energy over the next 15-20 years.

Finally, in terms of this section, how 'surprising' was last year's fall in carbon emissions? Or put differently, what message should we take from this fall for future carbon trends? Is this the beginning of the much hoped for downward trend in emissions or just a temporary COVID-induced dip?

The two elements combining to produce the near-record decline in carbon emissions – the falls in energy demand and in the carbon intensity of the energy mix – can both be largely traced back to the unprecedented decline in oil demand triggered by the lockdowns. This suggests that as lockdowns around the world are eased and economic activity begins to recover, there is a significant risk that last year's fall in carbon emissions will be reversed. Indeed, the IEA recently estimated that the level of carbon emissions last December was already back above pre-crisis levels.

What can we learn from the COVID-induced stress test?

Moving to the second question for today: what can we learn from the behaviour of the energy system in response to the extreme stress test induced by the pandemic?

The focus here is on the supply response: how did different parts of the energy industry react to the sudden, unexpected fall in demand? As I have already mentioned, it's striking that the relentless expansion of renewable energy was relatively unscathed by the pandemic. Impressive resilience.

I will say more about the good news story that is renewables later. For now, I am going to concentrate on oil and natural gas markets which were affected more severely by the events of last year. Moreover, oil and natural gas markets could become increasingly challenged as the energy transition gathers pace. So, it's interesting to ask whether we can learn anything about their future behaviour from their response to the stresses of last year.

358 TWh

increase in renewable power generation, the largest ever

Oil

Starting first with oil. Over the year as a whole, global oil production is estimated to have fallen by 6.6 Mb/d – again the largest fall in post-war history. To get a sense of the timing and composition of that supply response it is helpful to split the year into three phases.

Phase 1 covers the onset of the global pandemic from December 2019 to April 2020. This is the period in which global oil consumption literally collapsed, with demand reaching a trough in April of more than 20 Mb/d below pre-COVID-19 levels. Off the charts relative to anything seen in history.

The initial supply response was totally underwhelming. In fact, it was counterproductive. The obvious source of supply that could react quickly was OPEC. But as you know, the key OPEC+ meeting in early March ended in disagreement, with supply actually increasing for a period as a brief price war broke out.

Oil inventories accumulated at a record pace, increasing by around 750 million barrels in just four months. That scale of imbalance is unheard of and generated severe logistical issues, in terms of both the availability of storage and the ability of excess supplies to access storage sufficiently quickly.

Prices responded accordingly. Brent reached a low of below \$20/bbl in April. And oil markets made frontpage news as US WTI prices turned negative for the first time ever.

The second phase, from April to August, saw a significant supply response. The main supply reaction came from OPEC+, who agreed to cut oil production by 9.7 Mb/d between May and June, later extended to July. US tight oil also responded, with production falling by around 2 Mb/d between March and May.

The responsiveness of tight oil is typically framed in terms of the rapid decline rates in tight oil basins combined with the speed with which



new investment can be halted. But the pace of response seen in the US last spring was far quicker than natural decline, and was largely driven by producing wells being shut-in, due to a combination of logistics and economics.

The falls in US tight oil were compounded by falls in conventional supplies. All told, North American production fell by around 4 Mb/d between March and May – roughly twice that of Russia.

At the same time, demand partially recovered as lockdowns were eased, initially in Asia and increasingly in the US and Europe. This resulted in a convergence of production and consumption levels, with inventories broadly stable at their new elevated level.

The third and final phase, from August through to the end of the year, was one of gradual adjustment. Demand continued to edge up, although second waves of COVID-19 spreading across different regions slowed the pace of recovery. Some of the supply response, from both OPEC+ and US tight oil, was partially unwound. But continuing OPEC+ constraint and compliance meant the market moved into deficit and stocks began to normalize. By the end of the year, around half of the excess stocks accumulated during the first part of the year had been unwound. And prices had recovered to around \$50/bbl.

What lessons can we draw from this real-world stress test of global oil markets?

For me, the main lesson was OPEC+ was both able and willing to step in and stabilise oil markets. But whether this means it will always be able to do so, depends on the type of shock affecting oil markets. The nature of OPEC's power to shift supply intertemporally from one period to another means it has the ability to offset temporary, short-lived shocks.

Indeed, in response to an economics exam question of what type of demand shock is OPEC best able to stabilise – a global pandemic followed by a successful vaccine would be close to the perfect answer: relatively short-lived, temporary shocks. Which is what makes the initial failure of OPEC to reach agreement in March 2020 all the more surprising.

In contrast, the ability – and incentive – for OPEC to offset a sustained and growing fall in oil demand as the world transitions to net zero is less clear. In this case, there may be a greater incentive for individual OPEC members to worry more about protecting and growing their market shares and less about stabilizing markets.

-6.6 Mb/d

Fall in global oil production, the largest drop in post-war history

Oil market in 2020



Source: EIA (demand), IEA (supply), S&P Global Platts (prices).

Natural gas

Turning to natural gas markets. I want to focus on the European gas market, both because it's the largest market in which there is active gas-on-gas competition; and because of the key role it plays as the balancing market for liquefied natural gas (LNG) cargoes.

So, what can we learn from its behaviour in response to the stress caused by the pandemic, with European gas imports falling by over 8½% last year? The gas-on-gas competition in Europe takes the form of pipeline imports – predominantly from Russia – competing against LNG imports – largely from the US as the marginal source of LNG.

As LNG imports have increased in recent years it has raised the question of the extent to which Russia and other pipeline gas exporters will compete against LNG to maintain their market share or instead forgo some of that share to avoid driving prices too low. This issue could become more acute in a transition in which Europe moves away from natural gas and competition between different gas supplies intensifies.

Although there is lots of complicating detail, it appears that Russian exporters were prepared to forgo some market share last year. Pipeline imports from Russia as a share of European gas demand fell from 35% in 2019 to 31% in 2020, with much of the reduction happening in the first half of last year. Some of that reduction initially reflected the record storage levels which had been built up towards the end of 2019. But Russian volumes remained low through the second quarter when the impact of the pandemic on European gas demand was at its height.

In contrast, LNG imports were up year-on-year in the first half of 2020 and their share of European demand for the year as a whole was broadly unchanged at 21%. However, as to whether this provides a guide to the future behaviour of Russian pipeline exports is less clear.

The argument here is similar to the point we just discussed in the context of OPEC. In response to a fall in demand that is expected to be relatively short-lived, it may be entirely rational for pipeline exporters to use their flexibility to reduce supply temporarily to help stabilise the market and support prices. But the possible response to a sustained and growing contraction in gas imports as Europe transitions away from fossil fuels could be very different, with a stronger incentive for Russian pipeline exporters to compete to be the last producer standing.

One of the factors affecting the response of pipeline exporters last year was their perception of how low European prices would need to fall to shut-in LNG exports. Which takes us to the second aspect I mentioned, Europe as the balancing market for LNG flows. Until last year, this question of the shut-in price for LNG exports was largely hypothetical – shut-ins had never really occurred at scale. That all changed last year.

As European LNG forward prices fell below these operating costs, this triggered a significant shut-in of US LNG exports. Average utilization rates of US LNG facilities began to fall in April last year, reaching a low of around 30-35% at the height of the summer. US LNG exports still increased by around 30% in 2020 helped by three new LNG trains coming on stream and several others ramping up. But had it not been for the cancelling of cargoes, the growth in US exports would have been closer to 80%.

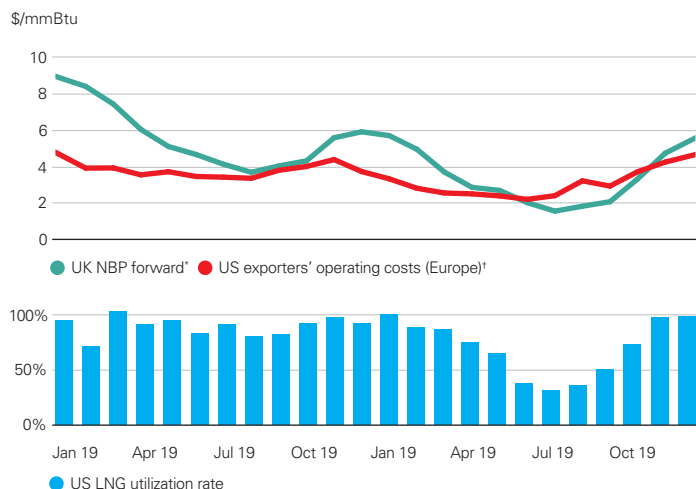
Progress since Paris – how is the world doing?

Finally, question three. With the build-up to the Glasgow COP gathering pace, I want to spend a few minutes putting last year's developments into the broader context of progress made since the Paris COP in 2015. The goals agreed at Paris are widely seen as a watershed in terms of achieving global alignment on ambitions for limiting temperature rises and all countries agreeing to make their contribution to achieving those aims.

So almost six years on from Paris, how is the world doing?

One of the biggest changes since 2015 is the marked increase in focus and ambition on getting to net zero. At the time of the Paris convention, no major country had made a formal commitment to achieve net zero.

US LNG: operating costs and utilization rates



* UK NBP represents the average of forward prices 2 months ahead
† US exporters operating costs to Europe = Henry Hub* 1.15 + LNG voyage costs (Platts)

That accolade went to Sweden, which in June 2017 pledged to reach carbon neutrality by 2045.

Fast forward to today, and 10 countries together with the European Union have passed net zero targets into law and a further 34 countries have either proposed legislation or outlined formal policy intentions with the same intent. The IEA recently estimated that together these commitments and intentions account for around 70% of global carbon emissions². Although still early days, there are encouraging signs that the collective jolt and huge costs of COVID-19 may have led to renewed determination to prevent an even more damaging global trauma in the form of climate change.

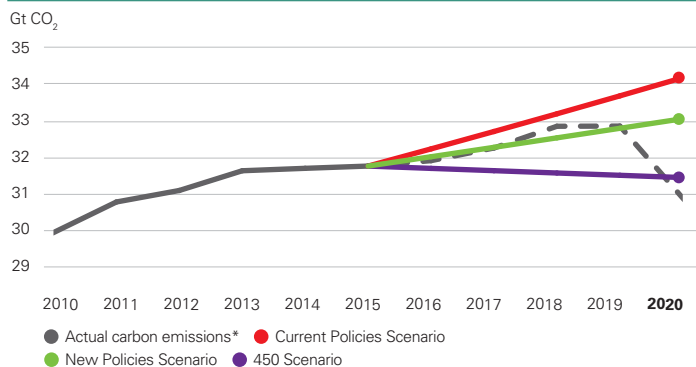
That rising level of ambition is also evident at the corporate level. On last count, the number of companies with stated aims or ambitions to get to net zero had increased more than six-fold since 2019 to more than 3000 companies. This rise in corporate ambition has coincided with growing societal expectations for companies to both increase further their transparency about climate-related risks and demonstrate their strategies and actions are consistent with Paris.

One manifestation of those changing societal expectations is the explosion in ESG-related investments. Inflows into ESG-related funds

2 https://iea.blob.core.windows.net/assets/20959e2e-7ab8-4f2a-b1c6-4e63387f03a1/NetZeroBy2050-ARoadmapfortheGlobalEnergySector_CORR.pdf (page 33).



IEA's 2015 World Energy Outlook and carbon emissions



*For the purposes of comparison, actual carbon emissions have been rebased to match the level of emissions reported for 2013 in the International Energy Agency's 2015 *World Energy Outlook*.

have increased from less than \$30 billion in 2015 to over \$330 billion in 2020 – an 11-fold increase in just five years. The world of investing seems to have changed for good – in both senses of the word.

Although these developments are hugely encouraging, they come with two major caveats. First, countries' pledges still don't go far enough. Despite the substantial increase in net zero aims and intentions at national and regional levels, the UN NDC Synthesis Report, published last December, concluded that 'the current levels of climate ambition are not on track to meet our Paris Agreement goals'³.

Second, there is a mismatch between these ambitions and the outcomes the world needs and wants to see. The Paris agreement was met with huge hope and optimism, but that hasn't yet been reflected in a marked improvement in the actual emissions data.

The IEA's *World Energy Outlook* (WEO) published in November 2015, just prior to the Paris COP, contained three scenarios for carbon emissions based on different assumptions about the future setting of global energy policies: a continuation of current policies (shown in red in the chart); the implementation of declared policy intentions (in green); and a set of policies consistent with limiting global temperature increases to 2°C (in purple).

Until last year, carbon emissions had continued their unrelenting rise, broadly in line with the policy intentions that had been declared prior to the Paris meeting. Importantly, there was no sign of the decisive shift envisaged by the 'less than 2°C' purple scenario. The COVID-induced fall in carbon emissions last year put emissions closer to the 2-degree pathway, but as discussed earlier, there is a good chance that much of that dip proves transitory.

Hope and ambition need to be translated into tangible, concrete differences.

Energy access

Although much of the attention of the Paris Agreement is on the response to climate change, the Agreement stipulates that this response should be in 'the context of sustainable development and efforts to eradicate poverty'⁴. The UN Sustainable Development Goals for 2030 (UN SDGs), which were adopted around the same time as the Paris COP, provide a natural benchmark for monitoring progress on this aspect of the Paris Agreement.

There are several strong inter-connections between these goals and the energy system, including on conservation and biodiversity, both on land (SDG 15) and in our oceans (SDG 14). But perhaps the closest to home is SDG 7: 'ensure access to affordable, reliable, sustainable and

modern energy for all'. The good news is that there have been significant improvements in energy access over the past six years.

The number of people without access to electricity has fallen from close to 1 billion in 2015, to a little over 750 million by 2019 – around 10% of the world's population, down from 15% in 2015.

Encouraging progress. However, just as with emissions, the progress comes with caveats.

The improvements have been uneven, with three-quarters of the global population without access to electricity situated in sub-Saharan Africa. Moreover, the impact of COVID-19 has reversed some of that progress. The World Bank estimates that the pandemic has made basic electricity services unaffordable for 30 million more people, the first time the number of people without access to electricity has increased for six years. And access to clean cooking facilities – the other focus of SDG 7 – lags far behind with around 2.6 billion people estimated not to have access.

Moreover, the concept of 'energy access' is somewhat nebulous. The UN defines access to electricity in terms of a minimum level of residential consumption. But the level of energy needed to support strong, sustainable economic growth is likely to far exceed that.

Energy is vital for productive uses as well as household consumption. For example, the Energy for Growth Hub propose a Modern Energy Minimum of 1000 kWh per person per year, which they argue is consistent with countries reaching a lower-middle income status⁵.

This is around four times greater than the UN definition. Importantly, the Energy for Growth Hub estimates that more than 3.5 billion people – close to half the world's population – are living below the Modern Energy Minimum.

Half the world's population – it makes you think.

Renewables

Arguably, the single most important element of the energy system needed to address both aspects of the Paris Agreement – respond to the threat of climate change and support sustainable growth – is the need for rapid growth in renewable energy. I am pleased to say that the progress on renewable energy over the past five or six years has been a perfect example of that tangible, concrete progress I mentioned.

If we start with what happened last year, focusing on wind and solar energy which is where most of the action is. Despite the huge disruptions associated with the global pandemic and the collapse in GDP, wind and solar capacity increased by a colossal 238 GW in 2020 – 50% larger than at any time in history.

The main driver was China, which accounted for roughly half of the global increase in wind and solar capacity. The expansion in Chinese wind capacity (72 GW) is particularly striking and it's likely that some of the reported increase reflects various changes to Chinese subsidy and accounting practices. But even controlling for that, it seems clear that 2020 was a record year for the build-out of wind and solar capacity.

Viewed over a slightly longer period, wind and solar capacity more than doubled between 2015 and 2020, increasing by around 800 GW, which equates to an average annual increase of 18%. To put that in context, in bp's *Rapid* and *Net Zero* scenarios, wind and solar capacity increase at an average annual rate of around 14% and 18% respectively over the next 10 years. So, the current pace of growth is broadly on track with those scenarios.

238 GW

increase in wind and solar capacity, 50% larger than any increase in history

³ Additional targets have been announced since December and the UN will publish an updated report prior to COP 26.

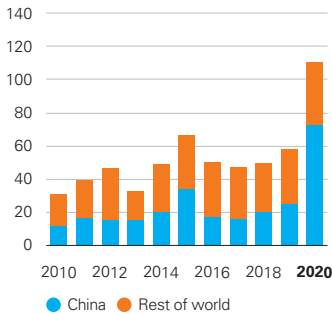
⁴ https://unfccc.int/sites/default/files/english_paris_agreement.pdf

⁵ <https://www.energyforgrowth.org/projects/modern-energy-minimum/>

Wind and solar power capacity

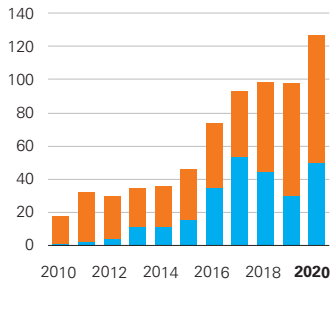
Wind capacity

Annual change, GW



Solar capacity

Annual change, GW



The challenge is to maintain the recent pace of growth as the overall size of renewable energy expands. In that context, what has underpinned the strong growth over the past five years?

Along with many other forecasters, we materially underestimated the growth of wind and solar power over the past five years. A key factor underpinning this under-estimation is that costs of renewable energy have fallen by far more than projected in bp's 2016 *Energy Outlook*. The costs of onshore wind and solar power have fallen by around 40% and 55% respectively over the past five years⁶. Far more than the 15% and 20% assumed in the 2016 *Outlook*.

Although it's a gross simplification, cost reductions for renewables are often summarised in terms of a 'learning-by-doing' framework. As ever-increasing amounts of renewable capacity are produced and installed, the supply chain learns how to become more and more efficient, driving costs progressively lower. Viewed in this way, renewable costs can fall by more than expected, either because the build-out of renewables is greater – hence allowing for 'more learning' – or because costs fall by more for a given level of build out – 'faster learning'.

Our analysis shows that the biggest factor accounting for the larger-than-expected falls in renewables costs is 'faster learning' – which explains around three-quarters of the error on wind costs and two-thirds for solar costs.

Interestingly, the majority of the 'more learning' contributions for both wind and solar over the past five years stem from China, as renewables have gained share from coal more quickly than expected. This transition has gone hand-in-hand with a massive scaling up of China's renewable manufacturing capacity, which has helped reduce the cost of wind and solar power around the world.

So, an upbeat message on renewables.

But it's important to remember that this pace of progress on renewable energy needs to be matched by the many other dimensions of the energy transition: energy efficiency; the growth of new energy vectors, such as hydrogen, to help decarbonize hard-to-abate sectors; and the build-out of carbon capture, use and storage (CCUS).

Continued rapid growth in renewable energy is necessary to get to net zero, but it's not sufficient.

⁶ Costs based on LCOE (levelized cost of electricity) averaged across three major demand centres (US, China and Europe).

Acknowledgements

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

Conclusion

70th birthdays are important milestones, providing an opportunity to reflect on the events that have shaped your life. There have certainly been many, many changes in global energy markets since the *Statistical Review* was first conceived in 1952.

But as my mother-in-law said to me recently, even at 70 you can still be surprised. And for the *Statistical Review* – like so many of us – 2020 will go down as one of the most surprising and most dramatic years in its life, with the largest declines in energy demand and carbon emissions seen in modern peacetime.

But the importance of the past 70 years pales into insignificance as we consider the challenges facing the energy system over the next 10, 20, 30 years as the world strives to get to net zero.

Will 2020 be seen as a turning point when the shock of COVID-19 finally caused the world to take decisive action to mitigate the threat of climate change?

Will the good intentions and increased ambitions of the past few years be translated into a sharp and sustained fall in emissions?

Will renewable energy be able to maintain the rapid rates of growth seen over the past five years?

And how important will the private sector – in the form of green and greening companies, prompted and supported by growing societal expectations – be in the eventual success or otherwise of the energy transition?

If 70th birthdays are important, 100-year anniversaries are really special. What events will the 100-year-old *Statistical Review* report as it analyses energy developments in 2050?

Spencer Dale
Chief economist
July 2021

In detail

Carbon dioxide emissions now include CO₂ emissions from natural gas flaring. Wind and solar capacity data have been included in the book for the first time.

Additional information – including historical time series for the fuels reported in the review; additional country and regional coverage for fuels consumption; further details on renewable forms of energy – together with the full version of Spencer Dale's presentation is available at bp.com/statisticalreview.

① Primary energy

Consumption*

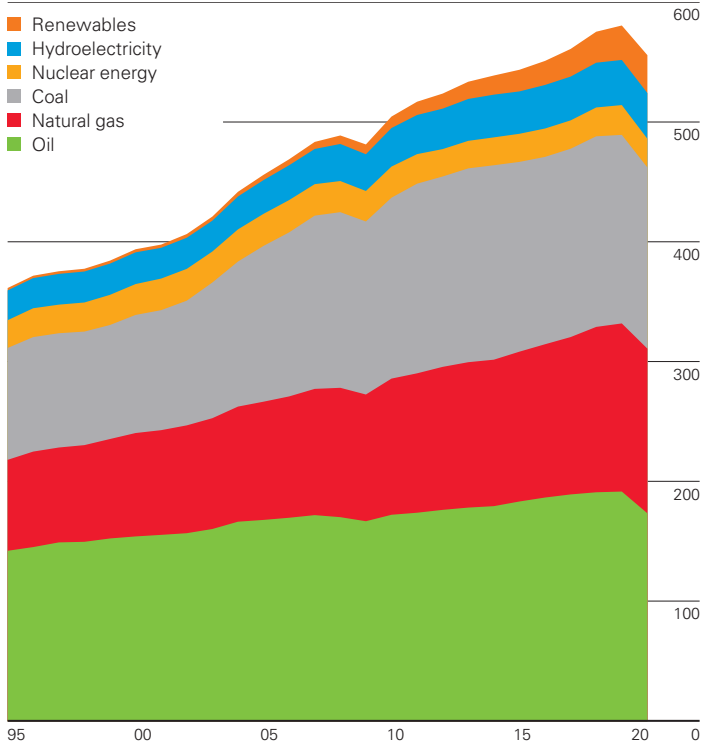
Exajoules	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Growth rate per annum		Share 2020
												2020	2009-19	
Canada	13.27	13.78	13.81	14.14	14.19	14.26	14.11	14.24	14.44	14.45	13.63	-5.9%	1.0%	2.4%
Mexico	7.31	7.66	7.71	7.74	7.70	7.69	7.79	7.90	7.84	7.55	6.48	-14.5%	0.6%	1.2%
US	92.91	92.05	89.62	92.04	92.99	92.09	91.96	92.26	95.64	94.90	87.79	-7.7%	0.5%	15.8%
Total North America	113.50	113.49	111.14	113.92	114.88	114.04	113.85	114.40	117.92	116.90	107.90	-8.0%	0.6%	19.4%
Argentina	3.23	3.34	3.46	3.59	3.59	3.66	3.63	3.64	3.59	3.38	3.15	-7.1%	0.8%	0.6%
Brazil	10.95	11.46	11.67	12.10	12.38	12.20	11.89	12.04	12.12	12.42	12.01	-3.6%	2.2%	2.2%
Chile	1.33	1.44	1.48	1.49	1.46	1.50	1.57	1.58	1.64	1.68	1.61	-4.9%	2.4%	0.3%
Colombia	1.44	1.48	1.59	1.60	1.68	1.70	1.78	1.82	1.85	1.91	1.77	-7.7%	3.4%	0.3%
Ecuador	0.55	0.59	0.62	0.64	0.67	0.67	0.66	0.69	0.73	0.74	0.65	-13.6%	4.1%	0.1%
Peru	0.81	0.90	0.93	0.94	0.97	1.02	1.09	1.11	1.17	1.19	1.00	-16.1%	5.2%	0.2%
Trinidad & Tobago	0.84	0.83	0.81	0.83	0.82	0.80	0.71	0.75	0.71	0.71	0.62	-12.5%	-0.9%	0.1%
Venezuela	3.36	3.44	3.61	3.65	3.47	3.43	2.99	2.93	2.47	1.95	1.44	-26.3%	-5.6%	0.3%
Other S. & Cent. America	3.67	3.79	3.84	3.84	3.84	4.01	4.21	4.20	4.29	4.35	3.95	-9.3%	1.9%	0.7%
Total S. & Cent. America	26.19	27.27	27.99	28.70	28.89	28.97	28.53	28.75	28.58	28.33	26.19	-7.8%	1.3%	4.7%
Austria	1.48	1.38	1.45	1.44	1.38	1.38	1.43	1.46	1.43	1.50	1.38	-7.9%	0.5%	0.2%
Belgium	2.76	2.58	2.47	2.54	2.36	2.39	2.58	2.61	2.59	2.67	2.19	-18.1%	0.3%	0.4%
Czech Republic	1.84	1.79	1.78	1.75	1.71	1.68	1.65	1.72	1.72	1.70	1.54	-9.7%	-0.4%	0.3%
Finland	1.30	1.22	1.18	1.19	1.15	1.14	1.16	1.13	1.16	1.13	1.10	-2.8%	-0.6%	0.2%
France	10.65	10.24	10.23	10.33	9.89	9.95	9.79	9.72	9.88	9.67	8.70	-10.3%	-0.7%	1.6%
Germany	13.70	13.20	13.37	13.74	13.16	13.40	13.62	13.78	13.44	13.05	12.11	-7.5%	-0.1%	2.2%
Greece	1.34	1.31	1.23	1.16	1.09	1.10	1.08	1.13	1.13	1.19	1.00	-16.4%	-1.6%	0.2%
Hungary	0.99	0.96	0.90	0.85	0.85	0.90	0.91	0.96	0.97	0.98	0.97	-1.5%	0.1%	0.2%
Italy	7.27	7.13	6.92	6.60	6.24	6.42	6.45	6.52	6.57	6.45	5.86	-9.3%	-0.9%	1.1%
Netherlands	4.10	3.92	3.79	3.68	3.47	3.52	3.59	3.53	3.53	3.51	3.37	-4.2%	-1.0%	0.6%
Norway	1.73	1.75	1.94	1.82	1.87	1.89	1.91	1.92	1.90	1.78	1.93	8.2%	-0.1%	0.3%
Poland	4.18	4.20	4.07	4.09	3.93	3.97	4.15	4.31	4.37	4.24	4.01	-5.5%	0.8%	0.7%
Portugal	1.08	1.03	0.94	1.03	1.05	1.03	1.10	1.07	1.08	1.03	0.93	-9.8%	♦	0.2%
Romania	1.42	1.46	1.40	1.31	1.35	1.36	1.36	1.38	1.41	1.38	1.33	-3.5%	-0.3%	0.2%
Spain	6.08	5.97	5.93	5.62	5.51	5.59	5.64	5.72	5.79	5.60	4.97	-11.4%	-0.6%	0.9%
Sweden	2.16	2.13	2.26	2.12	2.11	2.17	2.14	2.21	2.16	2.24	2.20	-2.2%	1.0%	0.4%
Switzerland	1.23	1.17	1.23	1.26	1.21	1.18	1.11	1.11	1.13	1.18	1.08	-8.6%	-0.7%	0.2%
Turkey	4.50	4.81	5.11	5.07	5.23	5.72	6.01	6.37	6.29	6.51	6.29	-3.6%	4.3%	1.1%
Ukraine	5.10	5.27	5.17	4.89	4.33	3.59	3.75	3.49	3.62	3.42	3.31	-3.3%	-3.3%	0.6%
United Kingdom	8.92	8.43	8.53	8.48	7.99	8.08	7.99	7.96	7.95	7.73	6.89	-11.0%	-1.2%	1.2%
Other Europe	6.70	6.55	6.26	6.32	6.11	6.25	6.40	6.52	6.63	6.53	5.97	-8.8%	0.1%	1.1%
Total Europe	88.53	86.50	86.18	85.29	82.01	82.72	83.81	84.64	84.74	83.46	77.15	-7.8%	-0.2%	13.9%
Azerbaijan	0.47	0.52	0.54	0.55	0.56	0.62	0.61	0.60	0.62	0.65	0.62	-4.3%	3.2%	0.1%
Belarus	1.09	1.08	1.17	1.03	1.07	0.97	0.96	0.98	1.07	1.05	0.98	-7.0%	0.3%	0.2%
Kazakhstan	2.24	2.53	2.66	2.67	2.73	2.74	2.73	2.94	3.24	3.15	3.11	-1.7%	4.2%	0.6%
Russian Federation	27.99	28.92	28.98	28.65	28.72	28.23	28.82	29.00	30.11	29.90	28.31	-5.5%	1.1%	5.1%
Turkmenistan	0.90	1.00	1.09	0.97	1.00	1.20	1.19	1.17	1.31	1.43	1.40	-1.9%	5.5%	0.3%
Uzbekistan	1.88	1.95	1.93	1.96	2.02	1.93	1.85	1.85	1.92	1.92	1.87	-2.8%	0.2%	0.3%
Other CIS	0.67	0.71	0.74	0.71	0.73	0.72	0.73	0.76	0.83	0.80	0.82	1.5%	2.1%	0.1%
Total CIS	35.23	36.71	37.10	36.53	36.82	36.41	36.88	37.30	39.08	38.90	37.12	-4.8%	1.4%	6.7%
Iran	8.72	9.11	9.21	9.55	9.98	9.93	10.40	10.79	11.42	11.97	12.03	0.2%	3.4%	2.2%
Iraq	1.45	1.54	1.63	1.76	1.69	1.68	1.93	1.91	2.00	2.20	2.06	-6.3%	4.9%	0.4%
Israel	0.99	1.02	1.06	0.98	0.97	1.02	1.04	1.09	1.09	1.13	1.05	-7.4%	1.9%	0.2%
Kuwait	1.41	1.45	1.51	1.55	1.57	1.61	1.62	1.65	1.65	1.67	1.51	-9.9%	3.1%	0.3%
Oman	0.87	0.94	1.03	1.15	1.14	1.21	1.21	1.30	1.37	1.39	1.37	-1.8%	6.7%	0.2%
Qatar	1.20	1.40	1.60	1.73	1.87	2.13	2.08	2.02	1.78	1.93	1.71	-11.3%	6.4%	0.3%
Saudi Arabia	8.74	9.18	9.74	9.78	10.49	10.82	10.96	10.93	10.65	10.68	10.56	-1.4%	3.1%	1.9%
United Arab Emirates	3.50	3.67	3.87	4.08	4.04	4.46	4.64	4.65	4.59	4.55	4.19	-8.2%	3.2%	0.8%
Other Middle East	2.46	2.32	2.20	2.11	2.08	1.95	1.94	1.96	1.92	1.99	1.96	-1.8%	-2.0%	0.4%
Total Middle East	29.33	30.63	31.84	32.68	33.83	34.82	35.82	36.30	36.47	37.51	36.44	-3.1%	3.1%	6.5%
Algeria	1.58	1.67	1.83	1.93	2.11	2.22	2.22	2.25	2.42	2.50	2.30	-8.4%	4.5%	0.4%
Egypt	3.24	3.30	3.47	3.45	3.44	3.52	3.69	3.80	3.85	3.86	3.65	-5.8%	2.3%	0.7%
Morocco	0.70	0.73	0.75	0.77	0.78	0.79	0.80	0.84	0.86	0.94	0.88	-7.1%	4.1%	0.2%
South Africa	5.26	5.20	5.12	5.14	5.20	5.09	5.33	5.30	5.10	5.21	4.90	-6.1%	♦	0.9%
Other Africa	5.21	5.14	5.48	5.82	6.22	6.47	6.55	6.85	7.27	7.36	6.86	-7.0%	4.1%	1.2%
Total Africa	15.99	16.04	16.64	17.10	17.75	18.09	18.59	19.03	19.50	19.87	18.58	-6.7%	2.5%	3.3%
Australia	5.33	5.48	5.42	5.49	5.54	5.67	5.70	5.67	5.70	5.88	5.57	-5.5%	0.9%	1.0%
Bangladesh	0.90	0.98	1.05	1.08	1.12	1.31	1.33	1.38	1.47	1.64	1.59	-3.2%	6.4%	0.3%
China	104.29	112.54	117.05	121.38	124.82	126.53	128.63	132.80	137.58	142.03	145.46	2.1%	3.8%	26.1%
China Hong Kong SAR	1.16	1.19	1.14	1.17	1.14	1.18	1.21	1.29	1.30	1.24	0.93	-25.3%	1.1%	0.2%
India	22.48	23.80	25.04	26.02	27.79	28.68	29.95	31.14	33.14	33.89	31.98	-5.9%	4.7%	5.7%
Indonesia	6.40	6.88	7.32	7.56	7.02	7.09	7.17	7.47	8.07	8.65	7.63	-12.0%	4.0%	1.4%
Japan	21.11	20.02	19.89	19.73	19.22	18.92	18.70	18.91	18.80	18.37	17.03	-7.5%	-0.8%	3.1%
Malaysia	3.35	3.47	3.73	3.90	3.94	4.00	4.21	4.27	4.33	4.43	4.11	-7.4%	3.1%	0.7%
New Zealand	0.83	0.83	0.84	0.84	0.88	0.89	0.89	0.91	0.91	0.93	0.84	-9.9%	1.4%	0.2%
Pakistan	2.65	2.65	2.47	2.69	2.77	2.92	3.18	3.37	3.48	3.51	3.47	-1.4%	2.9%	0.6%
Philippines	1.22	1.24	1.28	1.38	1.45	1.59	1.73	1.90	1.96	2.02	1.82	-9.7%	5.5%	0.3%
Singapore	2.87	2.99	3.00	3.06	3.15	3.35	3.48	3.59	3.61	3.53	3.42	-3.4%	2.8%	0.6%
South Korea	10.82	11.33	11.44	11.47	11.57	11.75	12.03	12.27	12.43	12.25	11.79	-4.0%	2.1%	2.1%
Sri Lanka	0.24	0.25	0.25	0.25	0.27	0.29	0.31	0.33	0.35	0.36	0.33	-8.8%	4.9%	0.1%
Taiwan														

Primary energy: Consumption by fuel*

Exajoules	2019							2020						
	Oil	Natural gas	Coal	Nuclear energy	Hydro-electricity	Renewables	Total	Oil	Natural gas	Coal	Nuclear energy	Hydro-electricity	Renewables	Total
Canada	4.78	4.24	0.63	0.90	3.38	0.51	14.45	4.26	4.05	0.50	0.87	3.42	0.54	13.63
Mexico	3.24	3.17	0.54	0.10	0.21	0.30	7.55	2.46	3.11	0.21	0.10	0.24	0.36	6.48
US	37.13	30.57	11.34	7.60	2.54	5.71	94.90	32.54	29.95	9.20	7.39	2.56	6.15	87.79
Total North America	45.15	37.98	12.52	8.59	6.14	6.52	116.90	39.27	37.11	9.91	8.35	6.22	7.04	107.90
Argentina	1.15	1.68	0.03	0.08	0.33	0.12	3.38	1.03	1.58	0.03	0.09	0.27	0.13	3.15
Brazil	4.81	1.29	0.65	0.14	3.55	1.99	12.42	4.61	1.16	0.58	0.14	3.52	2.01	12.01
Chile	0.76	0.23	0.31	–	0.19	0.18	1.68	0.69	0.22	0.30	–	0.18	0.21	1.61
Colombia	0.68	0.48	0.20	–	0.48	0.06	1.91	0.55	0.50	0.27	–	0.39	0.05	1.77
Ecuador	0.49	0.02	–	–	0.22	0.01	0.74	0.40	0.02	–	–	0.22	0.01	0.65
Peru	0.54	0.30	0.03	–	0.28	0.04	1.19	0.40	0.25	0.02	–	0.27	0.05	1.00
Trinidad & Tobago	0.08	0.63	–	–	–	†	0.71	0.08	0.54	–	–	–	†	0.62
Venezuela	0.59	0.92	†	–	0.43	†	1.95	0.48	0.68	†	–	0.28	†	1.44
Other S. & Cent. America	2.74	0.33	0.23	–	0.76	0.29	4.35	2.37	0.29	0.28	–	0.72	0.29	3.95
Total S. & Cent. America	11.84	5.88	1.45	0.22	6.25	2.69	28.33	10.62	5.24	1.48	0.23	5.87	2.75	26.19
Austria	0.55	0.32	0.12	–	0.36	0.15	1.50	0.48	0.31	0.09	–	0.36	0.14	1.38
Belgium	1.33	0.63	0.13	0.39	†	0.19	2.67	0.93	0.61	0.11	0.31	†	0.23	2.19
Czech Republic	0.42	0.30	0.60	0.27	0.02	0.09	1.70	0.37	0.30	0.49	0.27	0.02	0.09	1.54
Finland	0.39	0.07	0.15	0.22	0.11	0.19	1.13	0.35	0.07	0.13	0.21	0.14	0.19	1.10
France	3.14	1.57	0.27	3.56	0.50	0.63	9.67	2.68	1.46	0.19	3.14	0.54	0.68	8.70
Germany	4.66	3.19	2.25	0.67	0.18	2.10	13.05	4.21	3.12	1.84	0.57	0.17	2.21	12.11
Greece	0.64	0.19	0.22	–	0.04	0.12	1.19	0.51	0.21	0.11	–	0.03	0.14	1.00
Hungary	0.35	0.35	0.08	0.15	†	0.05	0.98	0.33	0.37	0.07	0.14	†	0.06	0.97
Italy	2.55	2.55	0.28	–	0.41	0.65	6.45	2.13	2.44	0.21	–	0.41	0.67	5.86
Netherlands	1.64	1.33	0.27	0.03	†	0.23	3.51	1.51	1.32	0.18	0.04	†	0.33	3.37
Norway	0.39	0.16	0.03	–	1.12	0.07	1.78	0.37	0.16	0.03	–	1.25	0.11	1.93
Poland	1.36	0.75	1.86	–	0.02	0.25	4.24	1.28	0.78	1.67	–	0.02	0.27	4.01
Portugal	0.50	0.22	0.05	–	0.08	0.18	1.03	0.41	0.22	0.02	–	0.11	0.17	0.93
Romania	0.45	0.39	0.21	0.10	0.14	0.10	1.38	0.44	0.41	0.15	0.10	0.13	0.10	1.33
Spain	2.70	1.30	0.16	0.52	0.20	0.73	5.60	2.21	1.17	0.07	0.52	0.24	0.77	4.97
Sweden	0.59	0.04	0.08	0.59	0.58	0.36	2.24	0.55	0.04	0.07	0.48	0.65	0.41	2.20
Switzerland	0.44	0.12	†	0.23	0.34	0.04	1.18	0.37	0.12	†	0.20	0.33	0.05	1.08
Turkey	2.01	1.56	1.76	–	0.79	0.39	6.51	1.82	1.67	1.66	–	0.69	0.45	6.29
Ukraine	0.48	1.02	1.08	0.74	0.06	0.05	3.42	0.45	1.06	0.98	0.68	0.06	0.09	3.31
United Kingdom	3.08	2.78	0.22	0.50	0.05	1.09	7.73	2.39	2.61	0.19	0.45	0.06	1.20	6.89
Other Europe	2.59	1.08	1.34	0.34	0.60	0.58	6.53	2.28	1.07	1.10	0.34	0.59	0.60	5.97
Total Europe	30.27	19.93	11.13	8.29	5.60	8.24	83.46	26.07	19.48	9.40	7.44	5.82	8.94	77.15
Azerbaijan	0.21	0.42	†	–	0.01	†	0.65	0.18	0.43	†	–	0.01	†	0.62
Belarus	0.30	0.69	0.06	–	†	†	1.05	0.28	0.64	0.06	–	†	†	0.98
Kazakhstan	0.76	0.63	1.66	–	0.09	0.01	3.15	0.75	0.60	1.64	–	0.09	0.03	3.11
Russian Federation	6.72	16.00	3.57	1.86	1.73	0.02	29.90	6.39	14.81	3.27	1.92	1.89	0.04	28.31
Turkmenistan	0.29	1.14	–	–	†	†	1.43	0.28	1.13	–	–	†	†	1.40
Uzbekistan	0.19	1.60	0.08	–	0.06	†	1.92	0.16	1.55	0.10	–	0.06	†	1.87
Other CIS	0.18	0.20	0.09	0.02	0.32	†	0.80	0.16	0.22	0.11	0.02	0.31	†	0.82
Total CIS	8.64	20.67	5.45	1.88	2.21	0.04	38.90	8.19	19.38	5.17	1.94	2.36	0.08	37.12
Iran	3.53	8.04	0.07	0.06	0.26	0.01	11.97	3.31	8.39	0.07	0.06	0.19	0.01	12.03
Iraq	1.47	0.70	–	–	0.02	†	2.20	1.29	0.75	–	–	0.02	†	2.06
Israel	0.50	0.39	0.21	–	–	0.03	1.13	0.42	0.41	0.17	–	–	0.05	1.05
Kuwait	0.83	0.83	0.01	–	–	†	1.67	0.76	0.74	†	–	–	†	1.51
Oman	0.48	0.90	0.01	–	–	†	1.39	0.42	0.93	0.01	–	–	†	1.37
Qatar	0.60	1.32	–	–	–	†	1.93	0.45	1.26	–	–	–	†	1.71
Saudi Arabia	6.67	4.00	†	–	–	0.01	10.68	6.51	4.04	†	–	–	0.01	10.56
United Arab Emirates	1.86	2.57	0.08	–	–	0.04	4.55	1.51	2.51	0.11	0.01	–	0.05	4.19
Other Middle East	1.09	0.84	0.01	–	0.02	0.03	1.99	1.03	0.86	0.01	–	0.02	0.04	1.96
Total Middle East	17.03	19.60	0.40	0.06	0.30	0.12	37.51	15.71	19.88	0.38	0.07	0.23	0.17	36.44
Algeria	0.85	1.63	0.02	–	†	0.01	2.50	0.72	1.55	0.02	–	†	0.01	2.30
Egypt	1.48	2.12	0.08	–	0.12	0.06	3.86	1.33	2.08	0.03	–	0.12	0.09	3.65
Morocco	0.56	0.04	0.28	–	0.01	0.06	0.94	0.50	0.03	0.28	–	0.01	0.06	0.88
South Africa	1.17	0.15	3.64	0.12	0.01	0.11	5.21	1.02	0.15	3.48	0.14	†	0.11	4.90
Other Africa	4.21	1.66	0.30	–	1.08	0.11	7.36	3.62	1.70	0.30	–	1.13	0.11	6.86
Total Africa	8.28	5.59	4.32	0.12	1.22	0.34	19.87	7.19	5.51	4.11	0.14	1.27	0.38	18.58
Australia	2.11	1.52	1.75	–	0.13	0.37	5.88	1.83	1.47	1.69	–	0.13	0.45	5.57
Bangladesh	0.38	1.11	0.14	–	0.01	†	1.64	0.33	1.10	0.15	–	0.01	†	1.59
China	27.94	11.10	81.79	3.11	11.34	6.75	142.03	28.50	11.90	82.27	3.25	11.74	7.79	145.46
China Hong Kong SAR	0.87	0.11	0.26	–	–	†	1.24	0.61	0.18	0.14	–	–	†	0.93
India	9.99	2.13	18.60	0.40	1.44	1.33	33.89	9.02	2.15	17.54	0.40	1.45	1.43	31.98
Indonesia	3.16	1.58	3.41	–	0.15	0.35	8.65	2.34	1.50	3.26	–	0.17	0.37	7.63
Japan	7.32	3.89	4.91	0.59	0.66	1.01	18.37	6.49	3.76	4.57	0.38	0.69	1.13	17.03
Malaysia	1.59	1.61	0.95	–	0.23	0.04	4.43	1.38	1.37	1.14	–	0.18	0.04	4.11
New Zealand	0.36	0.18	0.06	–	0.23	0.10	0.93	0.30	0.16	0.06	–	0.22	0.10	0.84
Pakistan	0.90	1.60	0.56	0.08	0.32	0.05	3.51	0.88	1.48	0.62	0.08	0.36	0.04	3.47
Philippines	0.91	0.15	0.73	–	0.07	0.15	2.02	0.75	0.14	0.73	–	0.06	0.15	1.82
Singapore	3.05	0.45	0.02	–	–	0.01	3.53	2.93	0.45	0.02	–	–	0.01	3.42
South Korea	5.16	2.02	3.44	1.30	0.02	0.30	12.25	4.90	2.04	3.03	1.42	0.03	0.36	11.79
Sri Lanka	0.25	–	0.06	–	0.04	0.01	0.36	0.21	–	0.07	–	0.04	0.01	0.33
Taiwan	1.98	0.84	1.67	0.29	0.05	0.07	4.90	1.89	0.90	1.63	0.28	0.03	0.09	4.82
Thailand	2.62	1.83	0.71	–	0.06	0.28	5.51	2.39	1.69	0.73	–	0.04	0.28	5.12
Vietnam	1.10	0.35	2.07	–	0.60	0.04	4.17	0.98	0.31	2.10	–	0.61	0.08	4.09
Other Asia Pacific	0.96	0.41	1.23	–	0.61	0.01	3.23	0.94	0.42	1.23	–	0.64	0.02	3.25
Total Asia Pacific	70.67	30.89	122.37	5.77	15.97	10								

World consumption

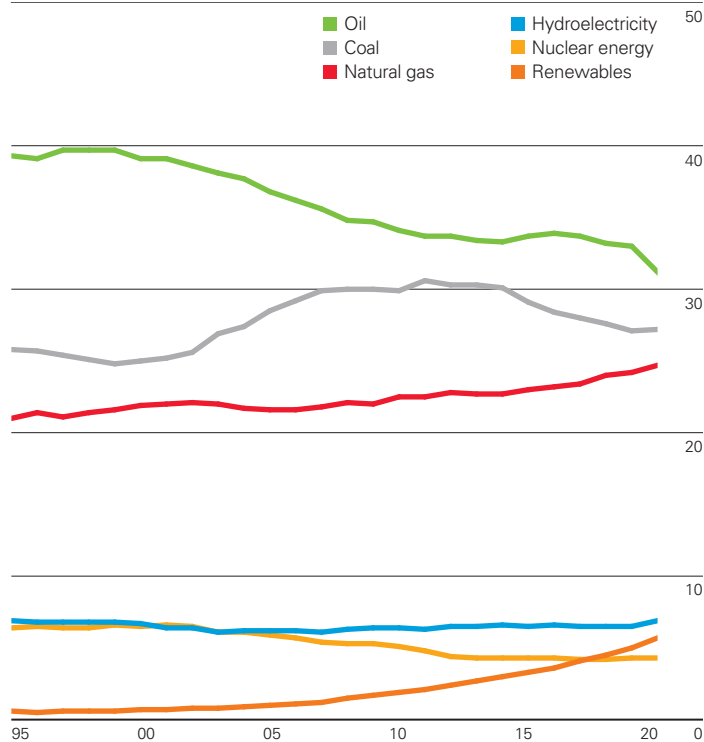
Exajoules



Primary energy consumption decreased by 4.5% last year, the first decline in energy consumption since 2009. The decline was driven largely by oil (-9.7%), which accounted for almost three quarters of the decrease. Consumption for all fuels decreased, apart from renewables (+9.7%) and hydro (+1.0%). Consumption fell across all the regions, with the largest declines in North America (-8.0%) and Europe (-7.8%). The lowest decrease was in Asia-Pacific (-1.6%) due to the growth in China (+2.1%), the only major country where energy consumption increased in 2020. In the other regions, the decline in consumption ranged between -7.8% in South and Central America to -3.1% in the Middle East.

Shares of global primary energy

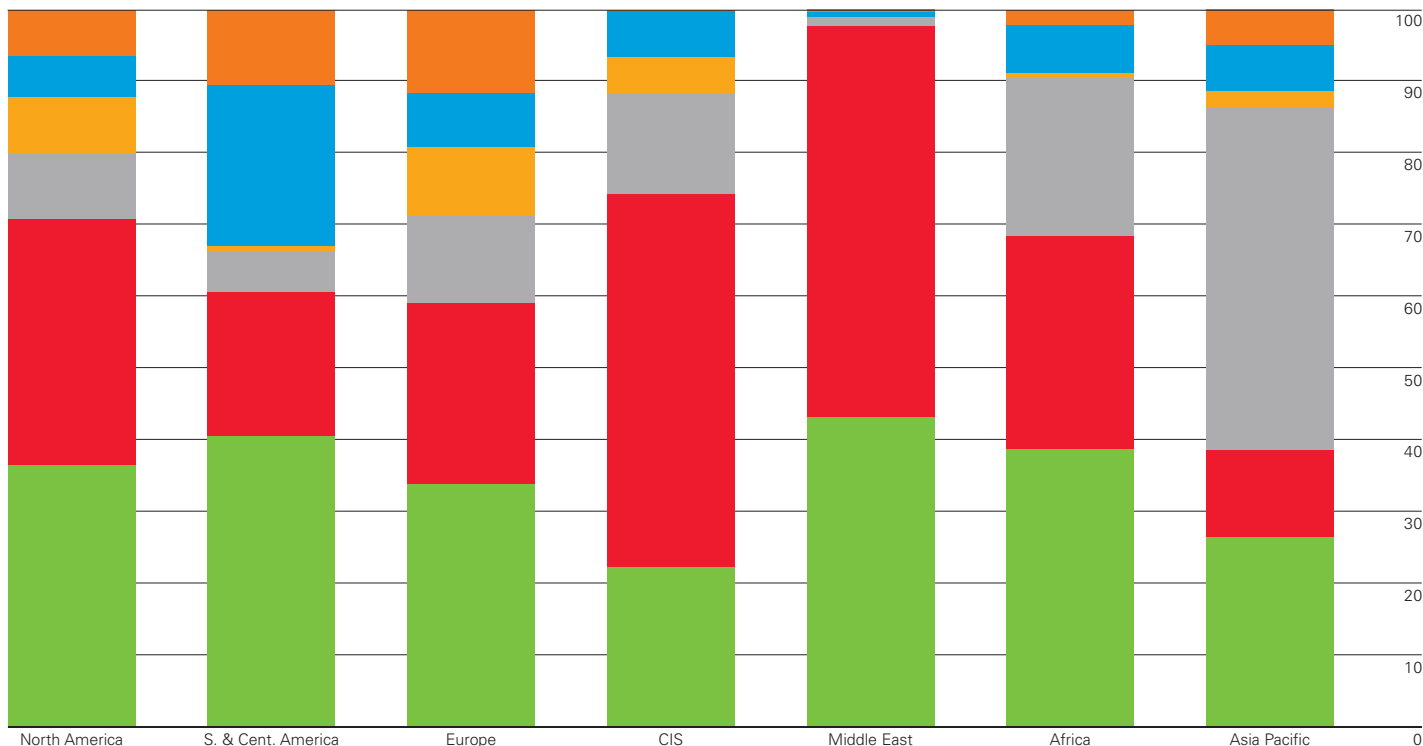
Percentage



Oil continues to hold the largest share of the energy mix (31.2%). Coal is the second largest fuel in 2020, accounting for 27.2% of total primary energy consumption, a slight increase from 27.1% in the previous year. The share of both natural gas and renewables rose to record highs of 24.7% and 5.7% respectively. Renewables has now overtaken nuclear which makes up only 4.3% of the energy mix. Hydro's share of energy increased by 0.4 percentage points last year to 6.9%, the first increase since 2014.

Regional consumption pattern 2020

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 2020 coal's share of primary energy fell to its lowest level in our data series in North America and Europe to 12% and 9%, respectively.

Primary energy: Consumption per capita*

Gigajoules per capita												Growth rate per annum	
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020	2009-19
Canada	388.8	398.9	395.5	400.7	398.0	395.9	387.7	387.8	389.4	386.3	361.1	-6.8%	-0.1%
Mexico	64.1	66.2	65.7	65.1	64.0	63.1	63.1	63.3	62.1	59.2	50.2	-15.4%	-0.6%
US	300.7	295.4	285.4	290.9	291.8	287.0	284.7	283.8	292.4	288.4	265.2	-8.3%	-0.2%
Total North America	248.2	245.7	238.4	242.1	242.0	238.2	235.9	235.1	240.5	236.6	216.8	-8.6%	-0.3%
Argentina	79.1	80.7	82.9	85.2	84.2	84.9	83.5	82.9	80.9	75.5	69.7	-8.0%	-0.2%
Brazil	56.0	58.0	58.5	60.2	61.1	59.7	57.7	57.9	57.8	58.9	56.5	-4.3%	1.4%
Chile	77.9	83.8	84.9	84.9	82.4	83.2	86.2	85.5	87.8	88.9	84.1	-5.7%	1.3%
Colombia	31.8	32.5	34.5	34.4	35.8	35.7	37.1	37.1	37.3	37.9	34.7	-8.6%	2.2%
Ecuador	36.8	38.4	39.9	40.6	42.0	41.2	40.3	40.9	42.5	42.8	36.6	-14.9%	2.4%
Peru	28.0	30.7	31.4	31.7	32.2	33.3	35.1	35.4	36.7	36.5	30.2	-17.3%	4.0%
Trinidad & Tobago	633.9	618.8	605.3	612.4	605.4	584.0	515.4	544.4	513.1	509.5	445.7	-12.8%	-1.5%
Venezuela	118.2	119.1	122.8	122.7	115.7	114.1	100.2	99.5	85.6	68.4	50.7	-26.0%	-5.8%
Other S. & Cent. America	35.1	35.8	35.8	35.4	35.0	36.1	37.6	37.0	37.5	37.6	33.8	-10.3%	0.8%
Total S. & Cent. America	54.9	56.5	57.4	58.3	58.1	57.7	56.3	56.2	55.4	54.4	49.9	-8.6%	0.4%
Austria	175.7	163.7	170.7	168.5	160.4	159.5	163.5	166.0	160.8	167.2	153.6	-8.4%	-0.2%
Belgium	252.6	234.2	223.0	227.6	210.2	211.9	227.1	228.2	225.3	231.2	189.0	-18.4%	-0.3%
Czech Republic	174.3	169.8	168.5	165.0	161.3	158.0	155.6	162.0	161.2	158.9	143.6	-9.9%	-0.6%
Finland	242.8	225.8	218.5	218.8	210.1	207.9	210.9	205.7	209.5	203.4	197.9	-3.0%	-1.0%
France	169.4	161.9	161.0	161.7	154.1	154.4	151.3	149.8	152.1	148.5	133.3	-10.5%	-1.1%
Germany	169.6	163.3	165.1	169.3	161.6	163.8	165.7	166.7	161.6	156.3	144.6	-7.8%	-0.4%
Greece	123.1	121.2	114.5	107.8	101.8	103.3	101.7	107.1	107.6	113.9	96.0	-16.0%	-1.2%
Hungary	99.8	97.2	90.9	86.5	86.6	91.5	93.8	98.7	99.6	101.2	100.2	-1.2%	0.3%
Italy	122.6	119.6	115.6	109.7	103.3	106.0	106.3	107.5	108.4	106.5	97.0	-9.2%	-1.1%
Netherlands	245.5	234.4	225.9	218.5	205.7	208.0	211.3	207.5	206.8	205.4	196.8	-4.5%	-1.2%
Norway	354.0	354.3	386.3	358.0	363.9	364.4	364.5	362.9	356.2	330.6	356.0	7.4%	-1.2%
Poland	109.1	109.8	106.6	107.1	103.3	104.5	109.3	113.7	115.1	111.8	106.0	-5.4%	0.9%
Portugal	101.7	97.3	89.3	98.1	100.6	99.2	106.3	103.8	105.8	100.9	91.5	-9.6%	0.4%
Romania	69.4	71.7	69.4	64.8	67.5	68.2	68.6	70.4	72.2	71.1	69.2	-2.9%	0.4%
Spain	129.5	126.8	126.1	119.7	117.9	119.8	121.0	122.5	124.0	119.7	106.3	-11.4%	-0.6%
Sweden	229.8	225.2	236.6	220.3	217.5	222.6	217.3	222.8	216.6	223.4	217.8	-2.8%	0.2%
Switzerland	157.4	147.6	153.8	155.9	146.8	142.0	132.3	131.4	132.3	136.9	124.5	-9.3%	-1.8%
Turkey	62.2	65.5	68.4	66.7	67.7	72.9	75.3	78.6	76.4	78.0	74.6	-4.6%	2.7%
Ukraine	111.3	115.6	113.7	108.0	95.9	79.9	83.9	78.5	81.8	77.7	75.8	-2.8%	-2.8%
United Kingdom	140.5	131.6	132.1	130.5	122.1	122.7	120.5	119.3	118.4	114.4	101.6	-11.5%	-1.9%
Other Europe	106.7	104.5	100.1	101.3	98.2	100.6	103.3	105.4	107.3	105.8	96.8	-8.7%	0.3%
Total Europe	134.4	130.9	129.9	128.2	122.8	123.5	124.7	125.5	125.3	123.1	113.6	-8.0%	-0.6%
Azerbaijan	51.9	57.0	58.0	58.8	59.2	64.0	62.6	60.7	61.9	64.5	61.3	-5.2%	1.9%
Belarus	115.6	115.1	124.3	109.5	113.1	102.7	102.1	104.0	113.2	111.5	103.9	-7.0%	0.2%
Kazakhstan	137.5	153.6	158.7	157.1	157.6	156.1	152.9	162.6	176.8	169.8	165.4	-2.8%	2.7%
Russian Federation	195.1	201.2	201.3	198.5	198.5	194.7	198.4	199.3	206.6	204.9	194.0	-5.6%	0.9%
Turkmenistan	176.6	192.7	206.4	180.0	183.1	215.3	209.5	203.9	223.4	240.1	232.7	-3.3%	3.7%
Uzbekistan	66.0	67.4	65.4	65.4	66.4	62.4	58.7	57.9	59.0	58.2	56.0	-4.2%	-1.4%
Other CIS	33.4	35.3	36.2	34.0	34.4	33.7	33.5	34.3	36.9	35.3	35.4	0.1%	0.6%
Total CIS	152.1	157.5	158.1	154.7	154.8	152.0	153.0	153.7	160.0	158.4	150.4	-5.3%	0.8%
Iran	118.2	122.1	121.9	124.8	128.9	126.5	130.8	133.8	139.6	144.4	143.2	-1.1%	2.1%
Iraq	48.8	50.0	51.2	53.1	49.0	47.3	52.8	50.8	52.0	55.9	51.3	-8.4%	1.7%
Israel	135.0	135.6	139.3	127.3	123.2	128.0	128.1	131.7	129.9	132.5	121.0	-8.9%	0.2%
Kuwait	472.6	458.7	451.1	438.6	425.9	420.9	408.3	406.1	398.4	396.6	352.9	-11.3%	-1.0%
Oman	284.9	289.8	293.5	304.9	283.8	283.1	270.2	278.7	283.9	279.5	268.2	-4.3%	1.0%
Qatar	646.7	686.1	726.4	740.3	759.6	829.6	783.2	740.8	639.7	679.7	594.2	-12.8%	0.9%
Saudi Arabia	318.6	324.9	334.0	325.5	339.4	341.1	337.7	330.2	315.9	311.7	303.3	-2.9%	0.5%
United Arab Emirates	409.2	410.7	423.2	443.9	438.2	481.9	495.9	490.6	476.7	466.0	423.7	-9.3%	1.0%
Other Middle East	39.6	36.7	34.3	32.5	31.8	29.5	29.0	29.0	28.0	28.6	27.6	-3.7%	-3.4%
Total Middle East	135.3	138.2	140.6	141.4	143.6	145.2	146.7	146.2	144.5	146.2	139.6	-4.7%	1.2%
Algeria	43.9	45.6	48.9	50.7	54.2	56.0	54.8	54.2	57.2	58.1	52.4	-10.1%	2.4%
Egypt	39.2	39.1	40.2	39.0	38.1	38.0	39.1	39.4	39.2	38.5	35.6	-7.6%	0.1%
Morocco	21.6	22.4	22.4	22.7	22.7	22.8	22.7	23.5	24.0	25.9	23.8	-8.2%	2.8%
South Africa	102.7	99.9	96.9	95.7	95.3	91.9	94.8	92.9	88.2	88.9	82.7	-7.3%	-1.5%
Other Africa	6.2	6.0	6.2	6.4	6.7	6.7	6.6	6.8	7.0	6.9	6.2	-9.4%	1.3%
Total Africa	15.4	15.0	15.2	15.2	15.4	15.3	15.3	15.3	15.3	15.2	13.9	-9.0%	-0.1%
Australia	240.5	243.3	236.5	235.9	234.8	237.0	234.8	230.5	228.8	233.2	218.4	-6.6%	-0.6%
Bangladesh	6.1	6.6	6.9	7.1	7.3	8.4	8.4	8.6	9.1	10.1	9.7	-4.1%	5.2%
China	76.2	81.8	84.6	87.2	89.2	89.9	91.0	93.5	96.4	99.1	101.1	1.7%	3.3%
China Hong Kong SAR	166.0	169.2	161.7	165.1	160.2	163.5	166.5	177.0	176.6	166.9	123.9	-25.9%	0.4%
India	18.2	19.0	19.8	20.3	21.4	21.9	22.6	23.3	24.5	24.8	23.2	-6.8%	3.5%
Indonesia	26.5	28.1	29.5	30.0	27.5	27.4	27.4	28.2	30.1	32.0	27.9	-13.0%	2.7%
Japan	164.2	155.8	154.9	153.7	149.9	147.9	146.4	148.3	147.8	144.8	134.7	-7.3%	-0.6%
Malaysia	118.8	121.1	128.3	132.5	131.9	132.0	137.1	137.2	137.3	138.7	127.1	-8.6%	1.7%
New Zealand	188.9	187.9	187.1	186.2	192.6	192.3	191.7	193.2	191.1	194.4	174.3	-10.6%	0.4%
Pakistan	14.8	14.4	13.2	14.0	14.2	14.6	15.6	16.2	16.4	16.2	15.7	-3.4%	0.8%
Philippines	13.0	13.0	13.2	13.9	14.4	15.5	16.7	18.1	18.3	18.6	16.7	-10.9%	3.8%
Singapore	559.5	567.1	558.3	561.8	570.5	599.5	615.3	628.8	626.3	607.8	583.9	-4.2%	1.2%
South Korea	218.3	227.5	228.5	227.8	228.6	231.2	235.9	240.1	242.9	239.1	229.9	-4.1%	1.7%
Sri Lanka	11.7	12.2	12.2	12.3	13.0	13.9	14.7	15.5	16.3	16.8	15.3	-9.2%	4.3%
Taiwan	205.5	203.1	201.3	204.7	208.7	208.0	207.6	208.0	210.4	206.2	202.3	-2.1%	0.7%
Thailand	65.3	67.5	71.8	72.7	74.3	75.8	77.1	78.2	79.6	79.2	73.3	-7.6%	2.5%
Vietnam	21.3	24.0	24.9	25.9	28.1	30.9	33.0	35.0	39.0	43.2	42.0	-3.0%	8.6%
Other Asia Pacific	11.6	11.3	11.7	11.3	12.0	12.4	13.3	13.4	13.4	17.1	17.0	-1.2%	4.9%
Total Asia Pacific	50.7	52.9	54.0	55.1	55.9	56.4	57.1	58.3	59.8	60.9	59.6	-2.3%	2.4%
Total World	72.6	73.5	73.6	74.1	73.9	73.8	73.9	74.4	75.5	75.4	71.4	-5.5%	0.7%
of which: OECD	182.1	179.0	176.1	176.6	174.0	173.4	173.1	173.6	175.3	172.7	159.1	-8.1%	-0.2%
Non-OECD	47.8	49.7	50.7	51.3	51.8	51.9	52.3	52.9	54.0	54.6	52.8	-3.6%	1.8%
European Union	148.1	143.4	141.4	140.0	134.8	136.3	137.7	139.2	139.0	136.5	125.2	-8.5%	-0.5%

*In this review, primary energy comprises commercially traded fuels, including modern renewables used to generate electricity.

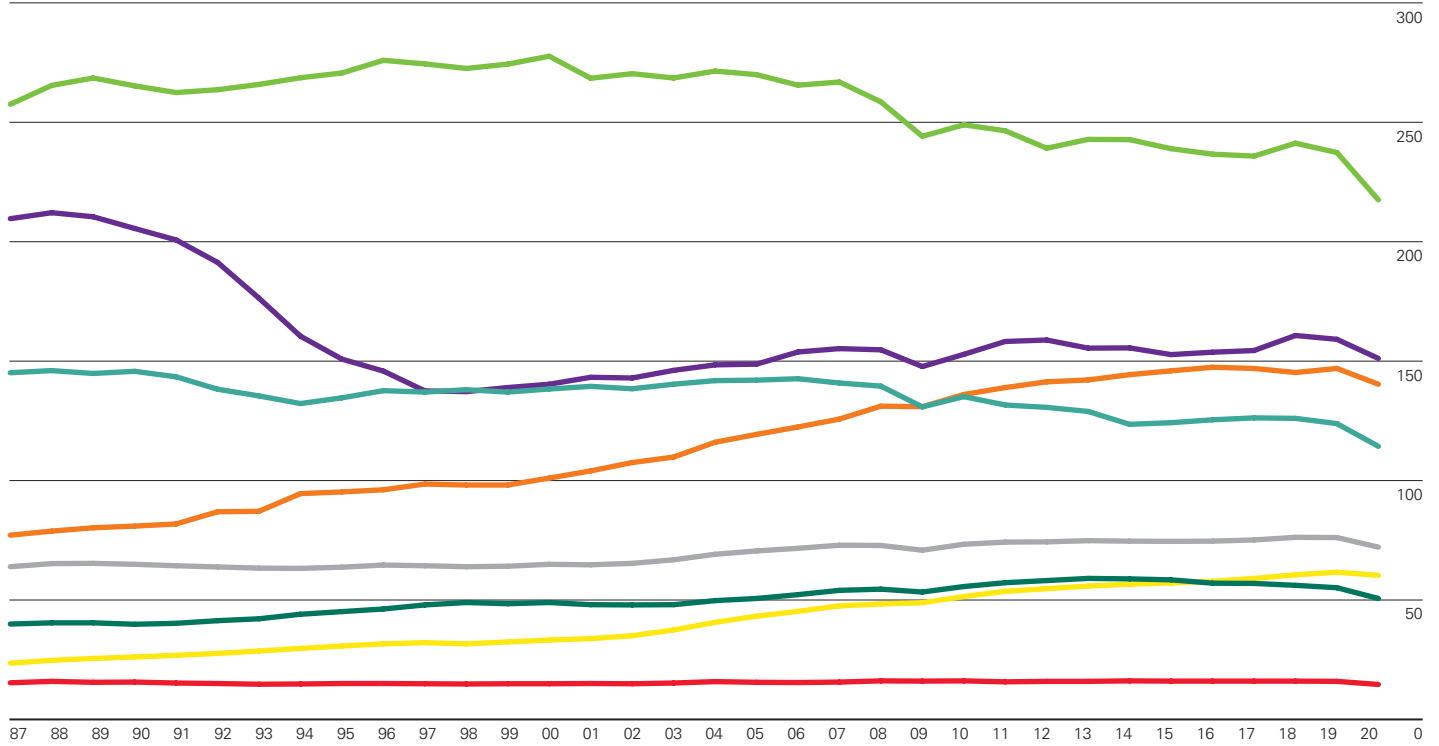
Energy from all sources of non-fossil power generation is accounted for on an input-equivalent basis. See the appendix or bp.com/statisticalreview for more details on this methodology.

Note: Growth rates are adjusted for leap years.

Energy per capita by region

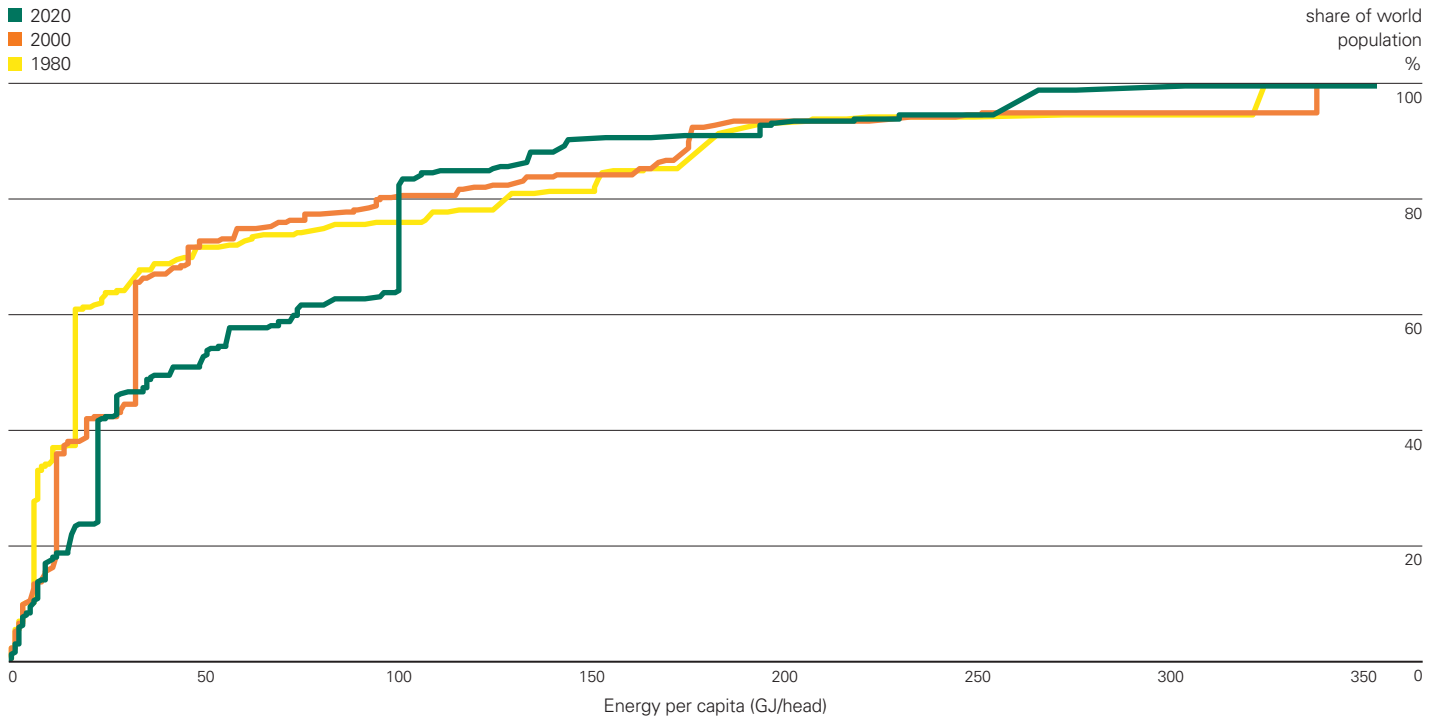
Gigajoules per head

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



Average global energy consumption per capita decreased by 5.5% in 2020 to 71.4 GJ/head, driven by declines in North America (-8.6%) and Europe (-8%). Energy demand per head fell in all other regions. North America is the region with the highest consumption per capita (217 GJ/head), followed by CIS (150 GJ/head) and the Middle East (140 GJ/head). Africa remains the region with the lowest average consumption (14 GJ/head).

Energy per capita: Distribution across countries



In 2020 63.7% of the global population lived in countries where average energy demand per capita was less than 100 GJ/head, a significant decrease from 81% in 199, as energy demand per capita in China increased to 101 GJ/head from 99 GJ/head in 199. The share of the global population consuming less than 75 GJ/head increased from 57% in 199 to 60.6% last year.

Total proved reserves

	At end 2000 Thousand million barrels	At end 2010 Thousand million barrels	At end 2019 Thousand million barrels	At end 2020			
				Thousand million barrels	Thousand million tonnes	Share of total	R/P ratio
Canada	181.5	174.8	169.1	168.1	27.1	9.7%	89.4
Mexico	24.6	10.4	6.1	6.1	0.9	0.4%	8.7
US	30.4	35.0	68.8	68.8	8.2	4.0%	11.4
Total North America	236.5	220.3	243.9	242.9	36.1	14.0%	28.2
Argentina	3.0	2.5	2.5	2.5	0.3	0.1%	11.3
Brazil	8.5	14.2	12.7	11.9	1.7	0.7%	10.8
Colombia	2.0	1.9	2.0	2.0	0.3	0.1%	7.1
Ecuador	2.7	2.1	1.3	1.3	0.2	0.1%	7.4
Peru	0.9	1.2	0.8	0.7	0.1	♦	15.5
Trinidad & Tobago	0.9	0.8	0.2	0.2	†	♦	8.7
Venezuela	76.8	296.5	303.8	303.8	48.0	17.5%	*
Other S. & Cent. America	1.3	0.8	0.7	0.8	0.1	♦	10.9
Total S. & Cent. America	96.0	320.1	324.0	323.4	50.8	18.7%	151.3
Denmark	1.1	0.9	0.4	0.4	0.1	♦	16.2
Italy	0.6	0.6	0.6	0.6	0.1	♦	14.7
Norway	11.4	6.8	8.5	7.9	1.0	0.5%	10.8
Romania	1.2	0.6	0.6	0.6	0.1	♦	22.7
United Kingdom	4.7	2.8	2.5	2.5	0.3	0.1%	6.6
Other Europe	2.1	1.9	1.6	1.6	0.2	0.1%	14.9
Total Europe	21.0	13.6	14.2	13.6	1.8	0.8%	10.4
Azerbaijan	1.2	7.0	7.0	7.0	1.0	0.4%	26.7
Kazakhstan	5.4	30.0	30.0	30.0	3.9	1.7%	45.3
Russian Federation	112.1	105.8	107.8	107.8	14.8	6.2%	27.6
Turkmenistan	0.5	0.6	0.6	0.6	0.1	♦	7.6
Uzbekistan	0.6	0.6	0.6	0.6	0.1	♦	34.7
Other CIS	0.3	0.3	0.3	0.3	†	♦	17.3
Total CIS	120.1	144.2	146.2	146.2	19.9	8.4%	29.6
Iran	99.5	151.2	157.8	157.8	21.7	9.1%	139.8
Iraq	112.5	115.0	145.0	145.0	19.6	8.4%	96.3
Kuwait	96.5	101.5	101.5	101.5	14.0	5.9%	103.2
Oman	5.8	5.5	5.4	5.4	0.7	0.3%	15.4
Qatar	16.9	24.7	25.2	25.2	2.6	1.5%	38.1
Saudi Arabia	262.8	264.5	297.6	297.5	40.9	17.2%	73.6
Syria	2.3	2.5	2.5	2.5	0.3	0.1%	158.8
United Arab Emirates	97.8	97.8	97.8	97.8	13.0	5.6%	73.1
Yemen	2.4	3.0	3.0	3.0	0.4	0.2%	86.7
Other Middle East	0.2	0.3	0.2	0.2	†	♦	2.6
Total Middle East	696.7	765.9	836.0	835.9	113.2	48.3%	82.6
Algeria	11.3	12.2	12.2	12.2	1.5	0.7%	25.0
Angola	6.0	9.1	7.8	7.8	1.1	0.4%	16.1
Chad	0.9	1.5	1.5	1.5	0.2	0.1%	32.5
Republic of Congo	1.5	2.0	2.9	2.9	0.4	0.2%	25.7
Egypt	3.6	4.5	3.1	3.1	0.4	0.2%	14.0
Equatorial Guinea	0.8	1.7	1.1	1.1	0.1	0.1%	18.7
Gabon	2.4	2.0	2.0	2.0	0.3	0.1%	26.4
Libya	36.0	47.1	48.4	48.4	6.3	2.8%	339.2
Nigeria	29.0	37.2	36.9	36.9	5.0	2.1%	56.1
South Sudan	n/a	n/a	3.5	3.5	0.5	0.2%	56.4
Sudan	0.3	5.0	1.5	1.5	0.2	0.1%	47.9
Tunisia	0.4	0.4	0.4	0.4	0.1	♦	32.7
Other Africa	0.7	2.3	3.7	3.8	0.5	0.2%	33.2
Total Africa	92.9	124.9	125.0	125.1	16.6	7.2%	49.8
Australia	4.9	3.8	2.4	2.4	0.3	0.1%	13.9
Brunei	1.2	1.1	1.1	1.1	0.1	0.1%	27.3
China	15.2	23.3	26.0	26.0	3.5	1.5%	18.2
India	5.3	5.8	4.7	4.5	0.6	0.3%	16.1
Indonesia	5.1	4.2	2.5	2.4	0.3	0.1%	9.0
Malaysia	2.1	3.6	2.7	2.7	0.4	0.2%	12.5
Thailand	0.5	0.4	0.3	0.3	†	♦	1.7
Vietnam	2.0	4.4	4.4	4.4	0.6	0.3%	58.1
Other Asia Pacific	1.3	1.1	1.4	1.3	0.2	0.1%	17.4
Total Asia Pacific	37.7	47.8	45.3	45.2	6.1	2.6%	16.6
Total World	1300.9	1636.9	1734.8	1732.4	244.4	100.0%	53.5
of which: OECD	262.7	238.5	261.5	260.0	38.3	15.0%	25.2
Non-OECD	1038.2	1398.3	1473.3	1472.4	206.1	85.0%	66.9
OPEC	833.0	1137.7	1214.7	1214.7	171.8	70.1%	108.3
Non-OPEC	468.0	499.1	520.1	517.7	72.6	29.9%	24.5
European Union	3.9	3.2	2.4	2.4	0.3	0.1%	16.8
Canadian oil sands: Total	174.9	169.2	162.4	161.4	26.2	9.3%	
of which: Under active development	11.7	25.9	19.9	18.9	3.1	1.1%	
Venezuela: Orinoco Belt	-	220.0	261.8	261.8	42.0	15.1%	

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.

† 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.

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.

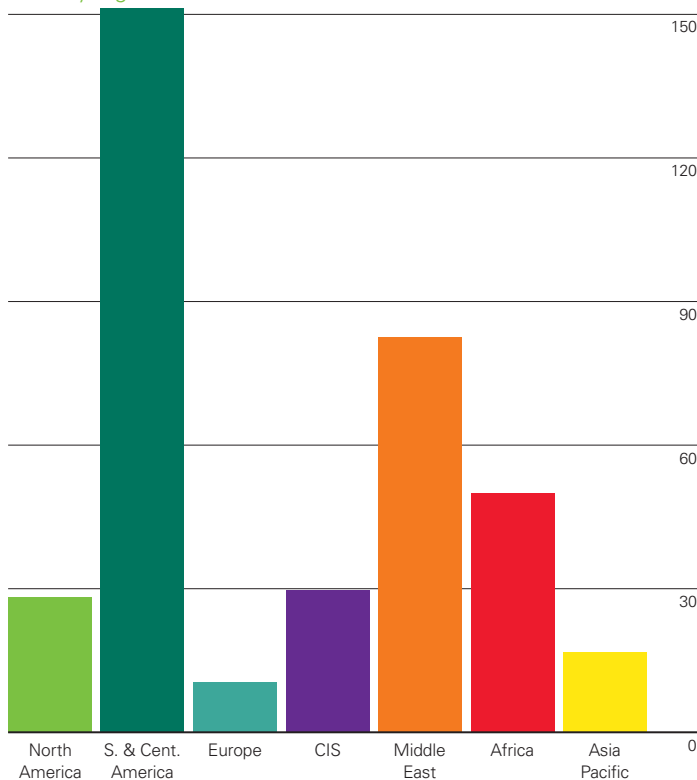
Reserves include gas condensate and natural gas liquids (NGLs) as well as crude oil.

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

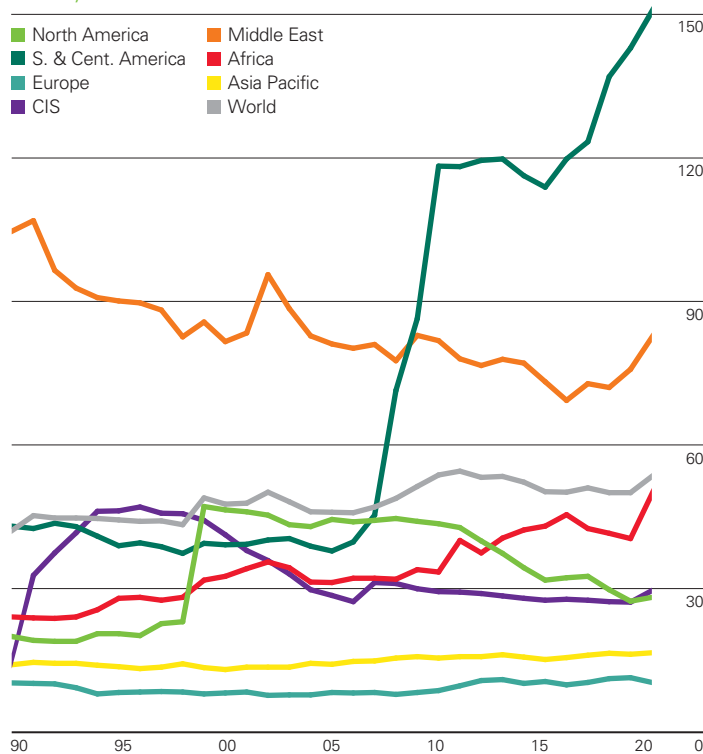
Reserves-to-production (R/P) ratios

Years

2020 by region



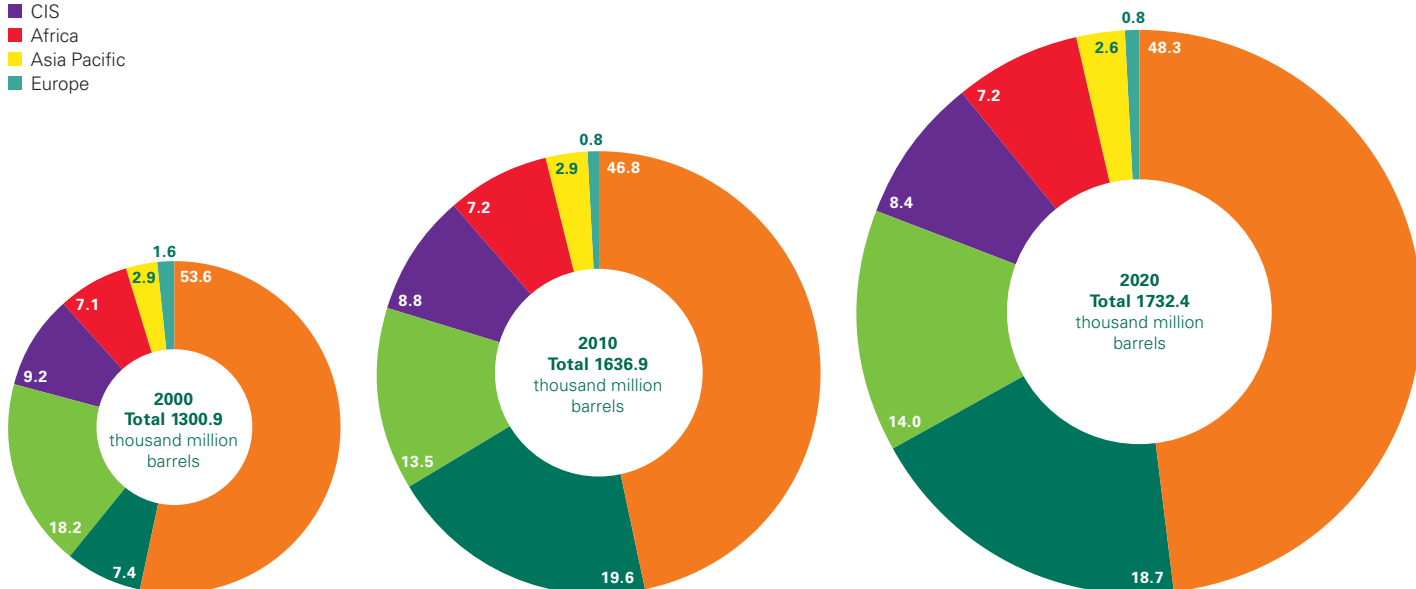
History



Global proved oil reserves were 1732 billion barrels at the end of 2020, down 2 billion barrels versus 2019. The global R/P ratio shows that oil reserves in 2020 accounted for over 50 years of current production. OPEC holds 70.2% 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 (9.7%).

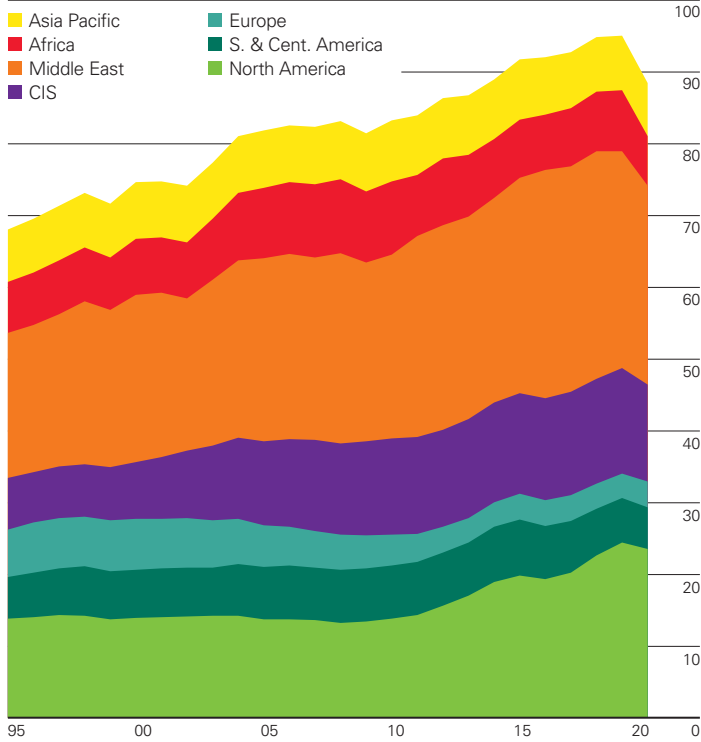
Distribution of proved reserves in 2000, 2010 and 2020

Percentage



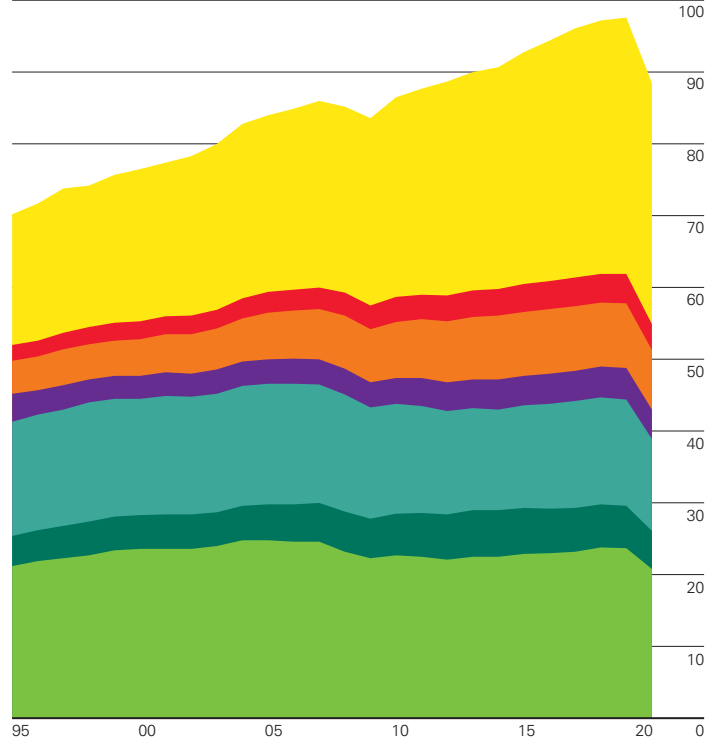
Oil: Production by region

Million barrels daily



Oil: Consumption by region

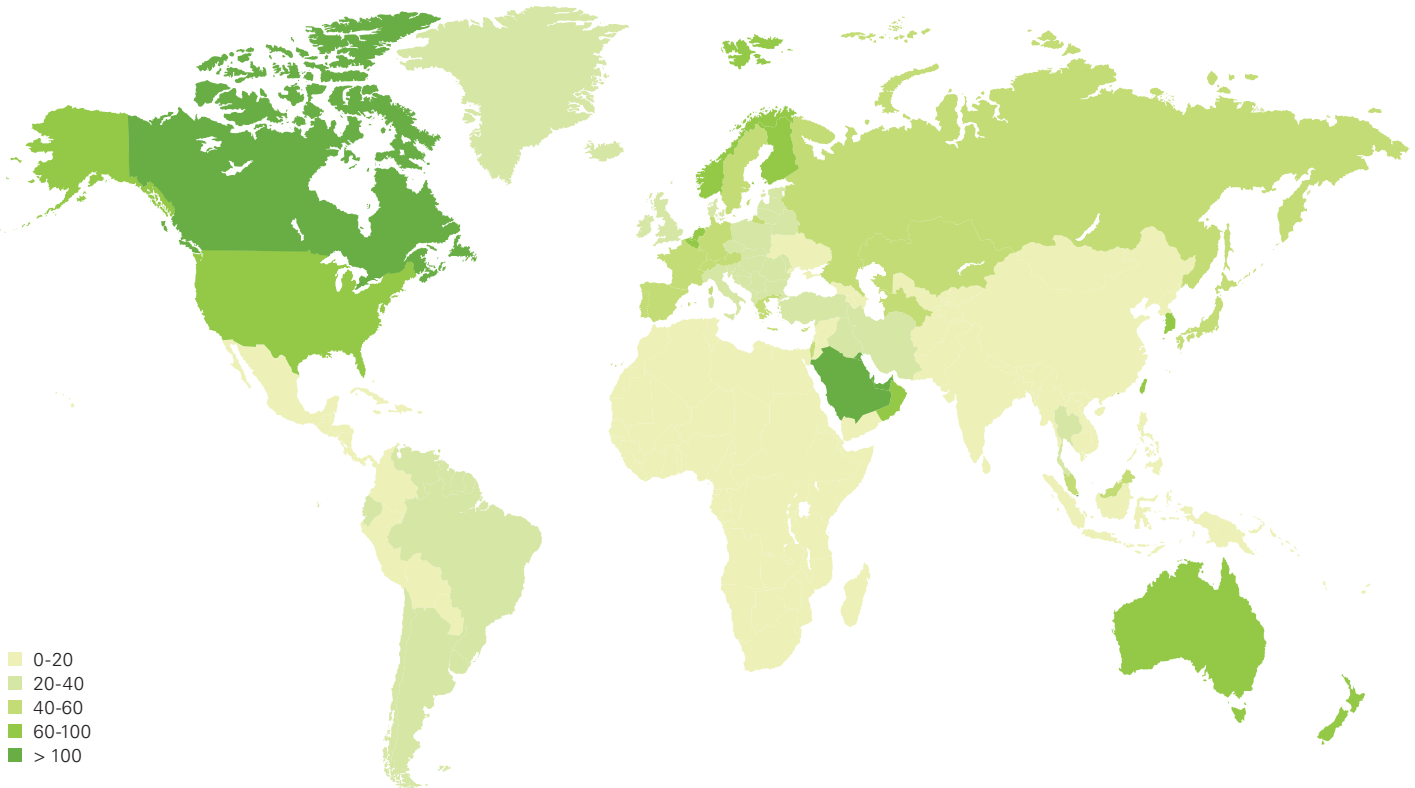
Million barrels daily



World oil production fell for the first time since 2009 by 6.6 million b/d in 2020 driven by both OPEC (-4.3 million b/d) and non-OPEC (-2.3 million b/d). Country wise, Russia (-1 million b/d), Libya (-920,000 b/d) and Saudi Arabia (-790,000 b/d). Production only increased in a few countries, mainly Norway (260,000 b/d) and Brazil (150,000 b/d). Oil consumption also dropped for the first time since 2009 by a massive 9.1 million b/d. The decline was in both the OECD (-5.8 million b/d) and the non-OECD (-3.3 million b/d). The US (-2.3 million b/d), the European Union (-1.5 million b/d) and India (-480,000 b/d) reported the largest declines. China was one of the few countries where demand increased in 2020 (220,000 b/d).

Oil: Consumption per capita 2020

GJ per capita



Spot crude prices

US dollars per barrel	Dubai \$/bbl*	Brent \$/bbl†	Nigerian Forcados \$/bbl	West Texas Intermediate \$/bbl‡
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	15.59	18.23	18.30	19.67
1990	20.21	23.73	23.85	24.46
1991	16.70	20.00	20.11	21.53
1992	17.18	19.32	19.61	20.57
1993	14.99	16.97	17.41	18.45
1994	14.69	15.82	16.25	17.21
1995	16.08	17.02	17.26	18.42
1996	19.26	20.67	21.16	22.16
1997	18.31	19.09	19.33	20.61
1998	12.30	12.72	12.63	14.39
1999	16.90	17.97	17.98	19.31
2000	26.27	28.50	28.42	30.37
2001	22.78	24.44	24.23	25.93
2002	23.60	25.02	25.04	26.16
2003	26.75	28.83	28.68	31.06
2004	33.51	38.27	38.13	41.49
2005	46.78	54.52	55.69	56.59
2006	61.48	65.14	67.07	66.04
2007	67.92	72.39	74.48	72.20
2008	94.28	97.26	101.43	100.06
2009	61.14	61.67	63.35	61.92
2010	77.78	79.50	81.05	79.45
2011	105.93	111.26	113.65	95.04
2012	109.06	111.67	114.21	94.13
2013	105.47	108.66	111.95	97.99
2014	97.02	98.95	101.35	93.28
2015	51.22	52.39	54.41	48.71
2016	41.02	43.73	44.54	43.34
2017	53.02	54.19	54.31	50.79
2018	70.15	71.31	72.47	65.20
2019	63.71	64.21	64.95	57.03
2020	42.41	41.84	42.31	39.25

*1973-1985 Arabian Light, 1986-2020 Dubai dated.

†1976-1983 Forties, 1984-2020 Brent dated.

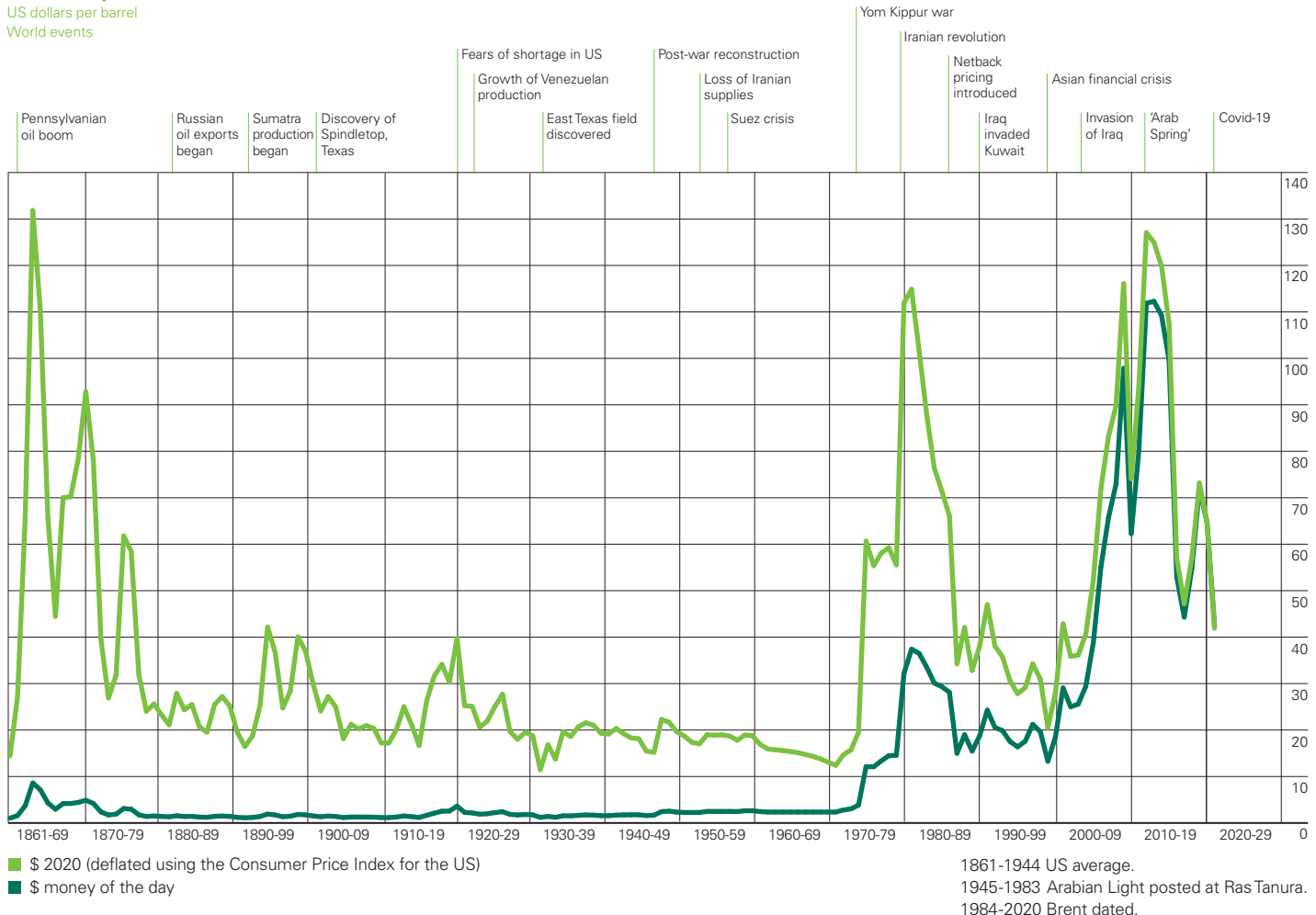
‡1976-1983 Posted WTI prices, 1984-2020 Spot WTI (Cushing) prices.

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

Crude oil prices 1861-2020

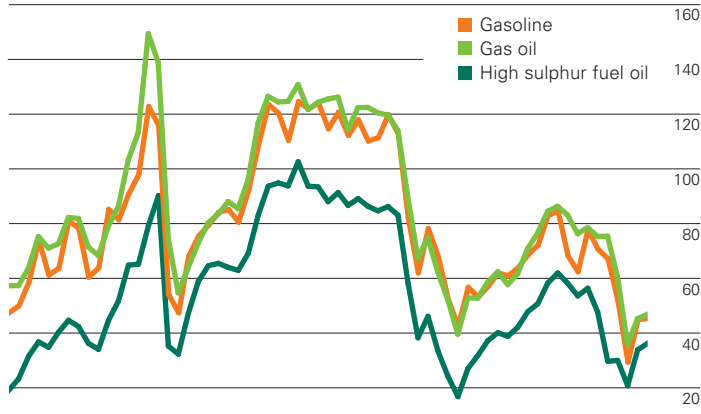
US dollars per barrel

World events



Oil product prices (Rotterdam)

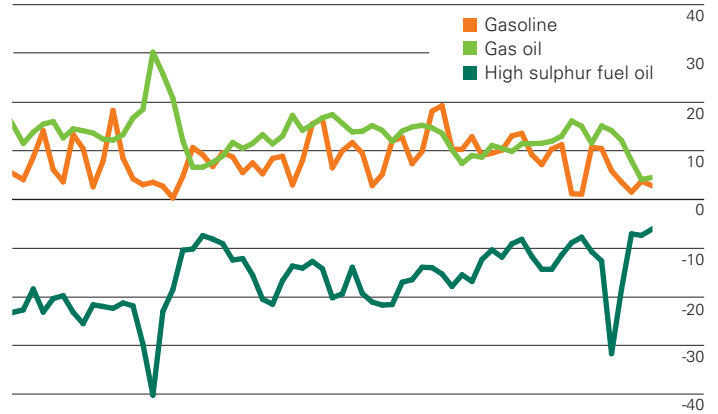
US dollars per barrel



Source: S&P Global Platts, © 2021, S&P Global Inc.

Product differentials to crude (Rotterdam products minus Dated Brent)

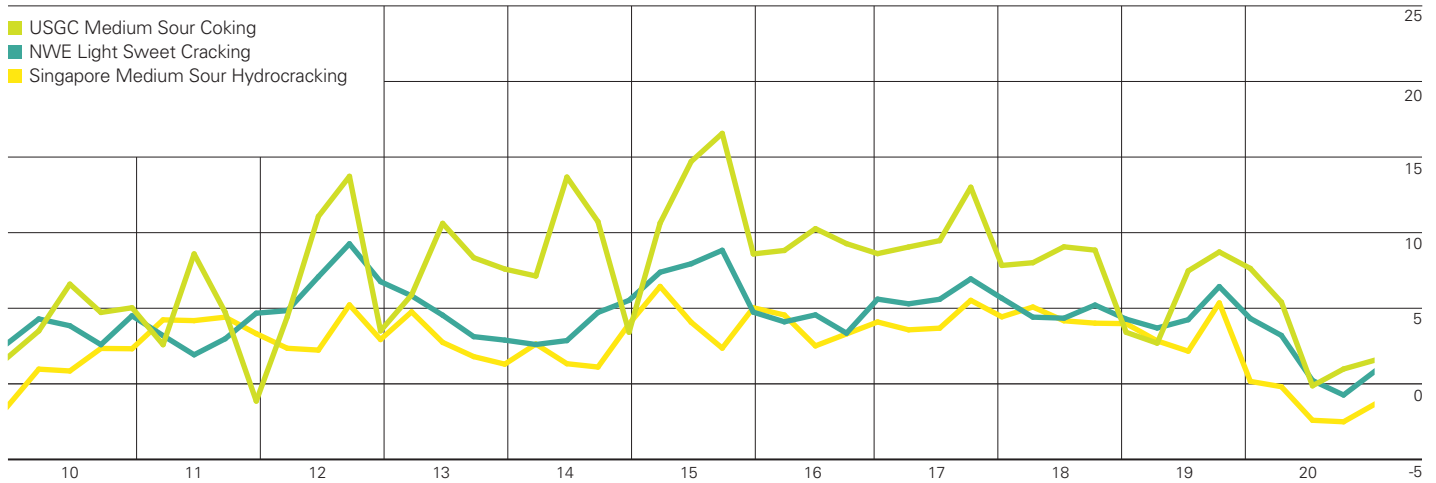
US dollars per barrel



Source: S&P Global Platts, © 2021, S&P Global Inc.

Regional refining margins

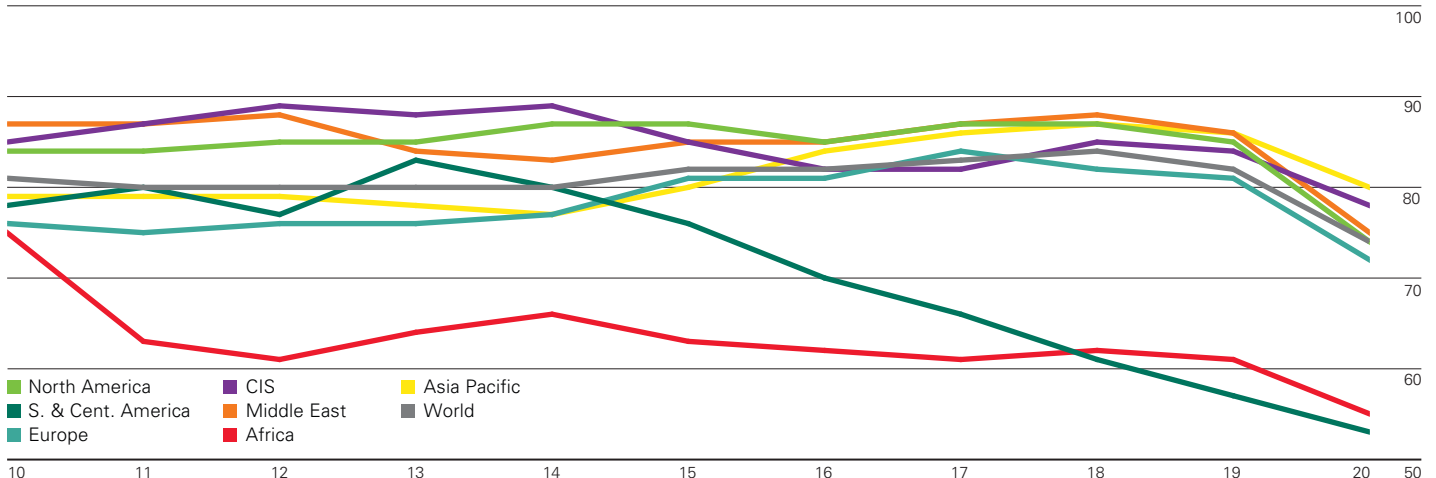
US dollars per barrel



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

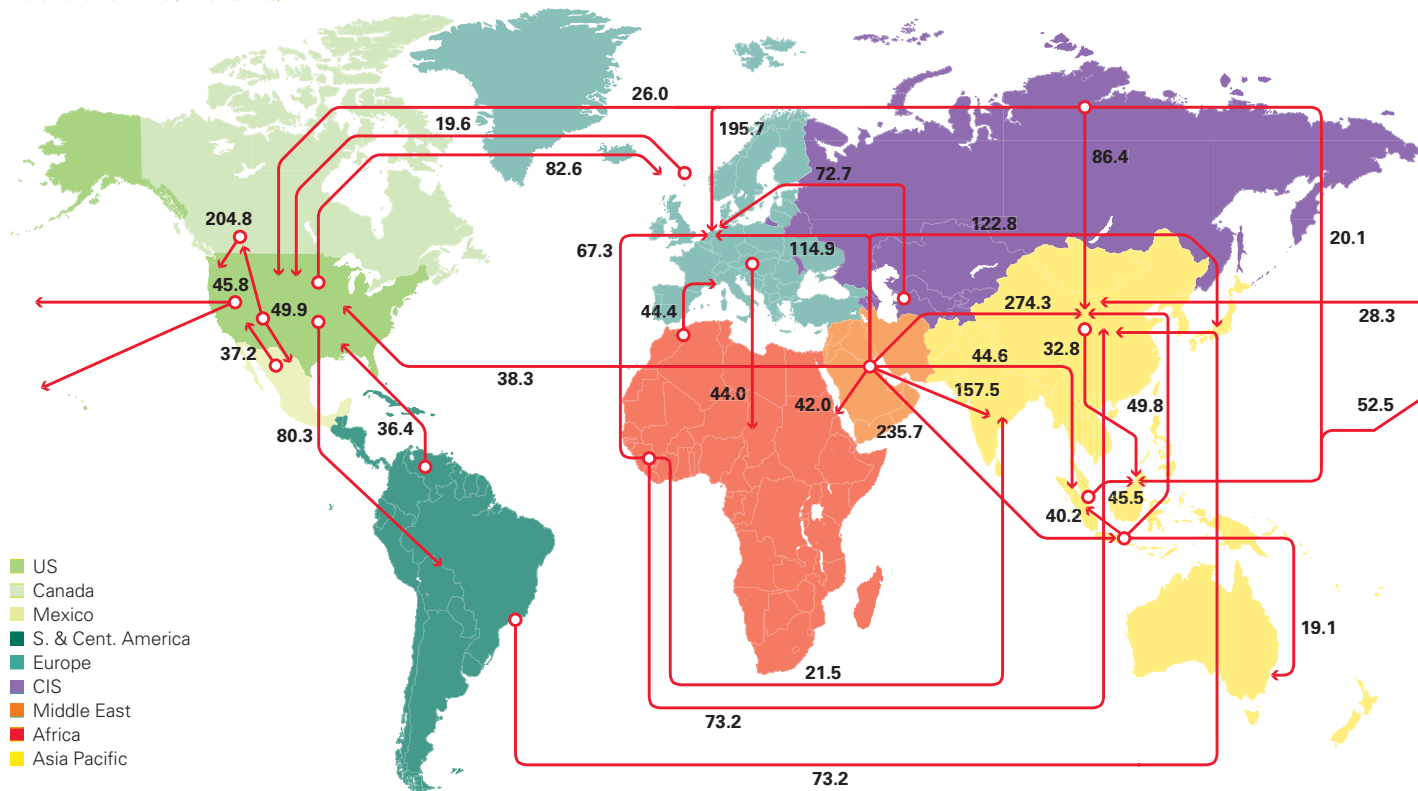
Percentage (based on average annual capacity)



Global refinery throughput dropped by 7.4 million b/d (-9.0%) in 2020 reflecting the weakness in demand for oil products. This is the largest fall in crude runs on record, surpassing the previous record -5.4% fall in 1981. Reduced runs were seen in all regions and were greatest in North America (-2.6 million b/d, -13.6%), and Europe (-1.5 million b/d, -11.8%). Refining capacity rose by just 0.2 million b/d, with additions in Asia being offset by closures in the US and Europe. As a result, global refinery utilization also fell dramatically by 8.0 percentage points to 74.1%, the largest annual decline on record. Utilization in South and Central America and Africa fell to new all-time lows of 53.3% and 54.6% respectively.

Major trade movements 2020

Trade flows worldwide (million tonnes)



Oil trade in 2019 and 2020

Million tonnes	2019				2020			
	Crude imports	Product imports	Crude exports	Product exports	Crude imports	Product imports	Crude exports	Product exports
Canada	34.8	32.8	197.7	34.4	27.9	28.7	189.3	30.5
Mexico	†	60.3	58.2	5.0	†	54.4	56.8	5.5
US	338.7	111.9	142.5	250.3	293.7	95.0	155.3	240.2
S. & Cent. America	21.1	109.4	146.8	24.6	17.8	94.5	145.7	25.7
Europe	556.0	177.0	28.1	123.6	475.9	147.7	28.2	104.4
Russia	†	0.6	289.0	123.3	†	0.7	260.0	106.8
Other CIS	18.5	1.7	93.9	12.0	15.2	2.4	93.2	9.9
Iraq	†	7.2	204.4	13.4	†	3.2	178.9	13.7
Kuwait	†	0.7	99.9	24.1	†	0.8	96.5	23.0
Saudi Arabia	0.1	10.0	366.0	53.7	0.1	13.6	349.1	49.7
United Arab Emirates	8.8	33.3	135.4	77.4	11.6	30.2	142.7	67.4
Other Middle East	26.0	18.8	120.5	60.7	22.3	16.4	107.7	58.4
North Africa	5.8	32.0	97.8	28.1	8.7	32.1	51.0	25.4
West Africa	0.4	36.1	226.8	8.4	0.5	38.1	203.7	7.9
East & S. Africa	19.6	41.6	5.5	2.6	16.3	38.6	3.8	2.7
Australasia	22.9	32.2	11.7	5.6	18.7	32.3	9.4	5.9
China	507.3	78.4	0.4	72.5	557.2	81.9	1.1	65.2
India	221.8	44.9	0.1	66.2	203.9	45.4	0.1	55.9
Japan	146.9	39.7	†	18.7	123.5	40.1	†	14.2
Singapore	49.6	112.4	1.9	76.9	46.1	97.1	1.7	71.5
Other Asia Pacific	287.3	210.4	39.0	110.1	269.0	201.9	34.6	111.5
Total World	2265.6	1191.5	2265.6	1191.5	2108.6	1095.2	2108.6	1095.2
Thousand barrels daily								
Canada	699	686	3971	719	558	598	3791	636
Mexico	†	1261	1169	104	†	1134	1138	114
US	6802	2340	2862	5233	5883	1981	3110	5007
S. & Cent. America	424	2287	2949	514	357	1969	2918	537
Europe	11167	3699	564	2583	9532	3079	564	2177
Russia	†	13	5803	2577	†	16	5207	2226
Other CIS	372	36	1885	250	304	50	1866	207
Iraq	†	150	4105	280	†	68	3583	285
Kuwait	†	16	2005	503	†	16	1933	479
Saudi Arabia	1	208	7351	1123	2	283	6991	1035
United Arab Emirates	177	696	2719	1618	233	629	2857	1405
Other Middle East	522	393	2421	1270	446	343	2156	1217
North Africa	116	669	1963	587	173	670	1021	529
West Africa	9	754	4555	175	11	795	4079	165
East & S. Africa	393	870	110	53	327	805	77	56
Australasia	459	672	234	117	374	673	187	122
China	10187	1639	9	1516	11158	1707	22	1360
India	4455	940	1	1384	4084	946	1	1165
Japan	2950	830	†	391	2474	836	†	295
Singapore	997	2350	39	1608	924	2025	33	1490
Other Asia Pacific	5769	4399	782	2302	5387	4210	693	2325
Total World	45497	24907	45497	24907	42229	22832	42229	22832

†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 2000 Trillion cubic metres	At end 2010 Trillion cubic metres	At end 2019 Trillion cubic metres	At end 2020			
				Trillion cubic metres	Trillion cubic feet	Share of total	R/P ratio
Canada	1.6	1.9	2.0	2.4	83.1	1.3%	14.2
Mexico	0.8	0.4	0.2	0.2	6.3	0.1%	5.9
US	4.8	8.3	12.6	12.6	445.6	6.7%	13.8
Total North America	7.3	10.5	14.8	15.2	535.0	8.1%	13.7
Argentina	0.8	0.3	0.4	0.4	13.6	0.2%	10.1
Bolivia	0.2	0.3	0.2	0.2	7.5	0.1%	14.8
Brazil	0.2	0.4	0.4	0.3	12.3	0.2%	14.6
Colombia	0.1	0.1	0.1	0.1	3.0	♦	6.5
Peru	0.2	0.3	0.3	0.3	9.2	0.1%	21.6
Trinidad & Tobago	0.5	0.4	0.3	0.3	10.2	0.2%	9.8
Venezuela	4.6	6.1	6.3	6.3	221.1	3.3%	333.9
Other S. & Cent. America	0.1	0.1	0.1	0.1	1.9	♦	19.7
Total S. & Cent. America	6.8	8.1	7.9	7.9	278.9	4.2%	51.7
Denmark	0.1	0.1	†	†	1.0	♦	20.3
Germany	0.2	0.1	†	†	0.7	♦	4.4
Italy	0.2	0.1	†	†	1.5	♦	10.9
Netherlands	1.6	1.2	0.1	0.1	4.6	0.1%	6.5
Norway	1.2	2.0	1.5	1.4	50.5	0.8%	12.8
Poland	0.1	0.1	0.1	0.1	2.6	♦	18.4
Romania	0.2	0.1	0.1	0.1	2.8	♦	9.1
Ukraine	0.8	0.7	1.1	1.1	38.5	0.6%	57.5
United Kingdom	0.7	0.3	0.2	0.2	6.6	0.1%	4.7
Other Europe	0.2	0.1	0.1	0.1	3.2	♦	14.3
Total Europe	5.4	4.7	3.3	3.2	111.9	1.7%	14.5
Azerbaijan	1.0	1.0	2.5	2.5	88.4	1.3%	96.9
Kazakhstan	1.7	1.7	2.3	2.3	79.7	1.2%	71.2
Russian Federation	33.2	34.1	37.6	37.4	1320.5	19.9%	58.6
Turkmenistan	1.8	13.6	13.6	13.6	480.3	7.2%	230.7
Uzbekistan	0.9	0.9	0.8	0.8	29.9	0.4%	18.0
Other CIS	†	†	†	†	0.1	♦	9.1
Total CIS	38.6	51.3	56.8	56.6	1998.9	30.1%	70.5
Bahrain	0.3	0.2	0.1	0.1	2.3	♦	3.9
Iran	25.4	32.3	32.1	32.1	1133.6	17.1%	128.0
Iraq	3.0	3.0	3.5	3.5	124.6	1.9%	336.3
Israel	†	0.2	0.6	0.6	20.8	0.3%	39.7
Kuwait	1.5	1.7	1.7	1.7	59.9	0.9%	113.2
Oman	0.8	0.5	0.7	0.7	23.5	0.4%	18.0
Qatar	14.9	25.9	24.7	24.7	871.1	13.1%	144.0
Saudi Arabia	6.0	7.5	6.0	6.0	212.6	3.2%	53.7
Syria	0.2	0.3	0.3	0.3	9.5	0.1%	89.6
United Arab Emirates	5.8	5.9	5.9	5.9	209.7	3.2%	107.1
Yemen	0.3	0.3	0.3	0.3	9.4	0.1%	2618.8
Other Middle East	†	†	†	†	0.2	♦	24.7
Total Middle East	58.3	77.8	75.8	75.8	2677.1	40.3%	110.4
Algeria	4.4	4.3	4.3	2.3	80.5	1.2%	28.0
Egypt	1.4	2.1	2.1	2.1	75.5	1.1%	36.6
Libya	1.2	1.4	1.4	1.4	50.5	0.8%	107.4
Nigeria	3.9	4.9	5.5	5.5	193.3	2.9%	110.7
Other Africa	1.0	1.2	1.6	1.6	55.4	0.8%	54.8
Total Africa	11.9	14.0	14.9	12.9	455.2	6.9%	55.7
Australia	1.7	2.9	2.4	2.4	84.4	1.3%	16.8
Bangladesh	0.3	0.3	0.1	0.1	3.9	0.1%	4.5
Brunei	0.4	0.3	0.2	0.2	7.9	0.1%	17.6
China	1.4	2.7	8.4	8.4	296.6	4.5%	43.3
India	0.7	1.1	1.3	1.3	46.6	0.7%	55.6
Indonesia	2.7	3.0	1.4	1.3	44.2	0.7%	19.8
Malaysia	1.1	1.0	0.9	0.9	32.1	0.5%	12.4
Myanmar	0.3	0.2	0.4	0.4	15.3	0.2%	24.4
Pakistan	0.5	0.6	0.4	0.4	13.6	0.2%	12.6
Papua New Guinea	†	0.1	0.2	0.2	5.8	0.1%	13.7
Thailand	0.4	0.3	0.1	0.1	5.1	0.1%	4.4
Vietnam	0.2	0.6	0.6	0.6	22.8	0.3%	74.1
Other Asia Pacific	0.2	0.3	0.2	0.2	6.7	0.1%	11.5
Total Asia Pacific	9.8	13.5	16.8	16.6	584.8	8.8%	25.4
Total World	138.0	179.9	190.3	188.1	6641.8	100.0%	48.8
of which: OECD	13.6	17.6	20.0	20.3	716.2	10.8%	13.7
Non-OECD	124.4	162.4	170.3	167.8	5925.6	89.2%	70.6
European Union	2.5	1.6	0.4	0.4	15.6	0.2%	9.2

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.

† Less than 0.05.

♦ Less than 0.05%.

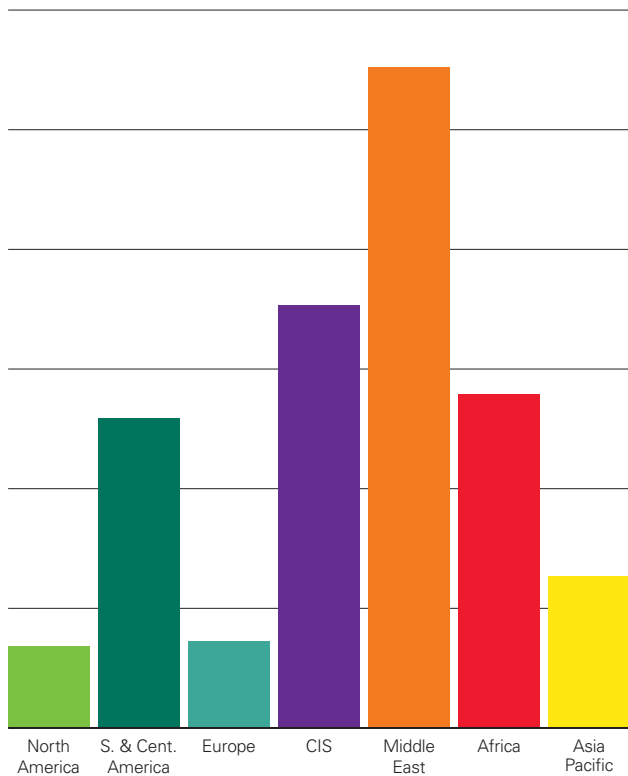
Notes: Total proved reserves of natural gas – generally taken to be those quantities that geological and engineering information indicates with reasonable certainty can be recovered in the future from known reservoirs under existing economic and operating conditions. The data series for total proved 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.

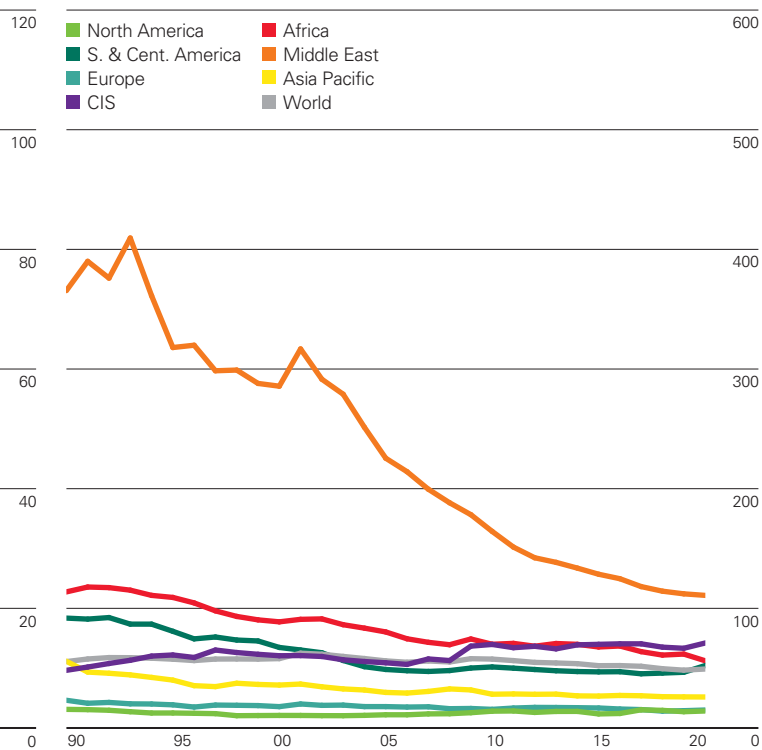
Reserves-to-production (R/P) ratios

Years

2020 by region



History

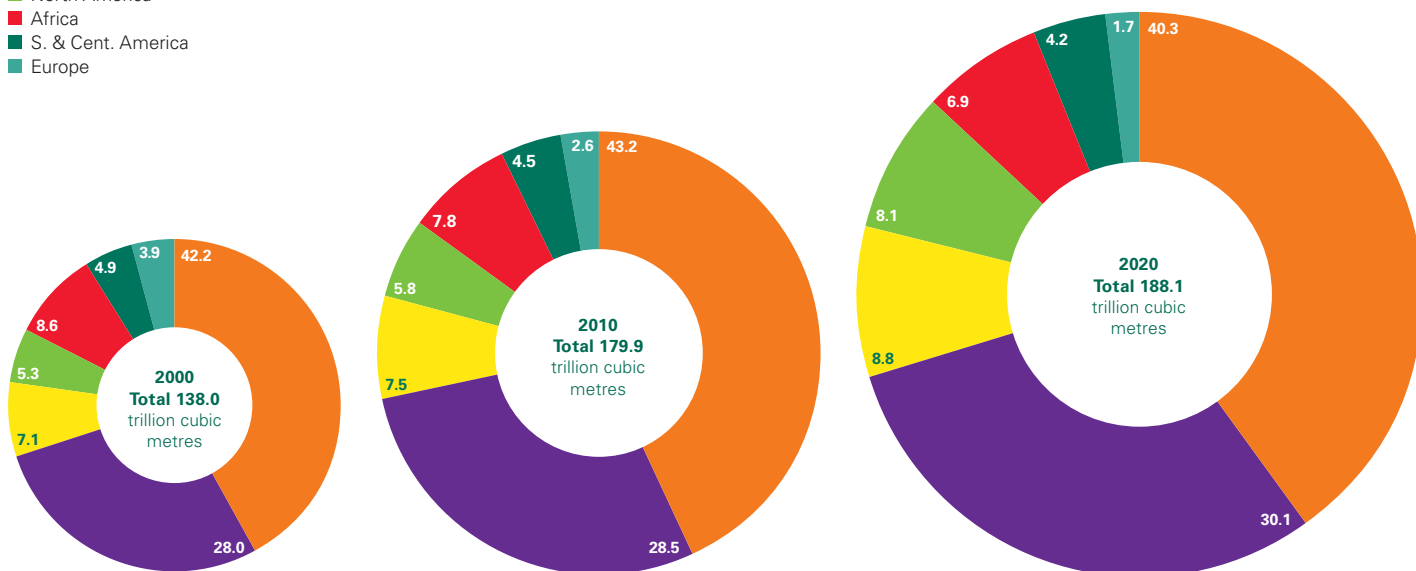


World proved gas reserves decreased by 2.2 Tcm to 188.1 Tcm in 2020. A revision to Algeria (-2.1 Tcm) provided the largest decrease, partially offset by a 0.4 Tcm increase in Canadian reserves. Russia (37 Tcm), Iran (32 Tcm) and Qatar (25 Tcm) are the countries with the largest reserves. The current global R/P ratio shows that gas reserves in 2020 accounted for 48.8 years of current production. The Middle East (110.4 years) and CIS (70.5 years) are the regions with the highest R/P ratio.

Distribution of proved reserves in 2000, 2010 and 2020

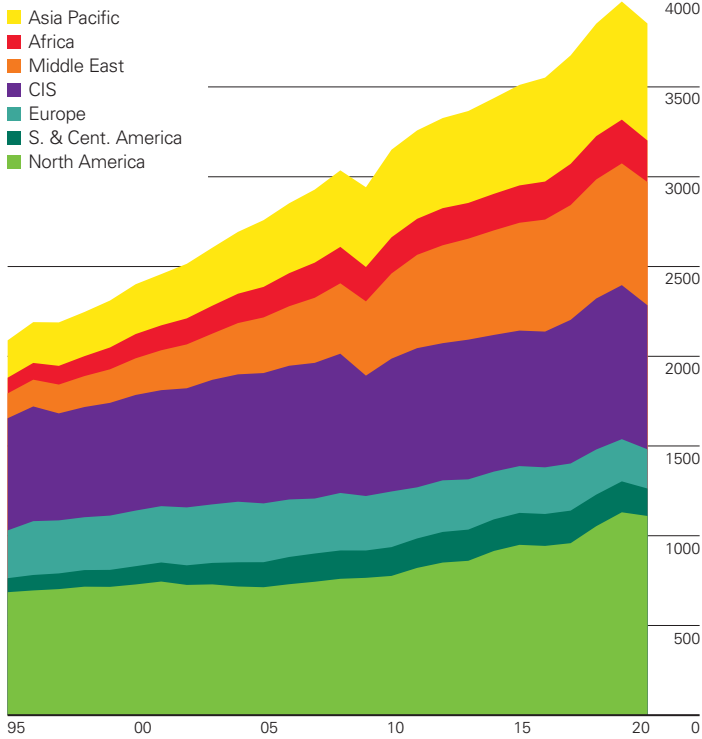
Percentage

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



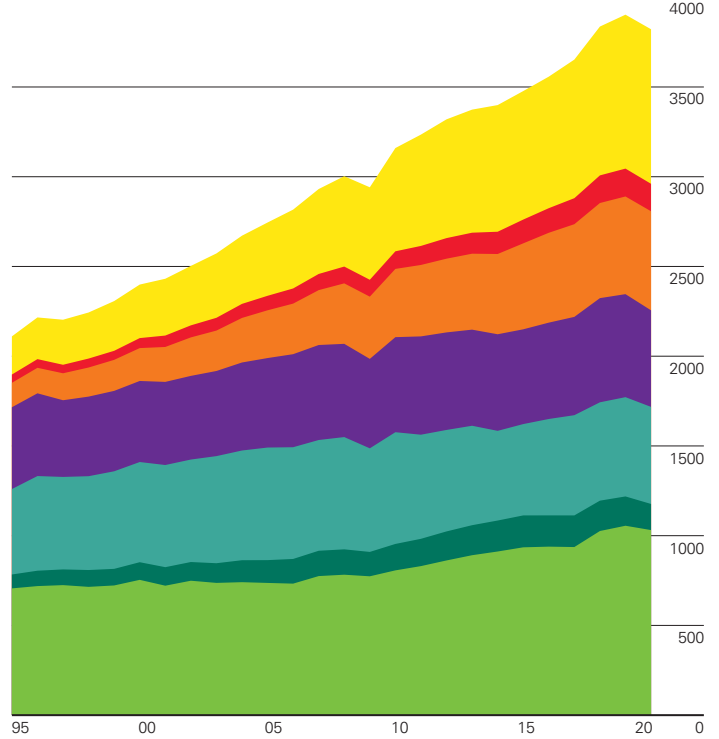
Natural gas: Production by region

Billion cubic metres



Natural gas: Consumption by region

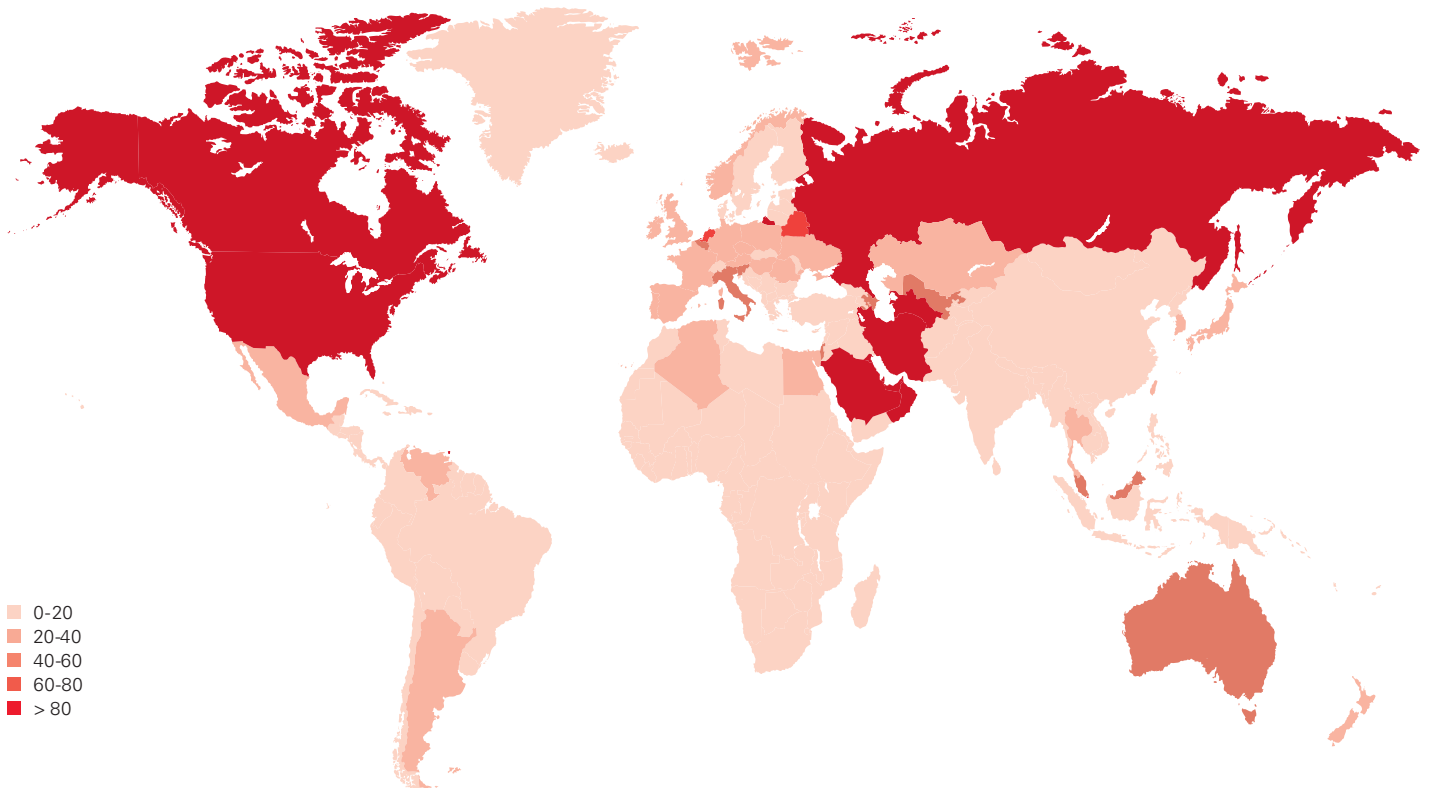
Billion cubic metres



Natural gas consumption decreased by 2.3% or 81 billion cubic metres (bcm), similar to the fall seen in 2009 during the financial crisis. Gas consumption fell in most regions, with a notable exception in China where demand grew by 6.9%. In contrast, gas demand dropped in North America and Europe by 2.6% and 2.5% respectively. Gas production fell by 123 bcm (-3.3%), with the largest drops seen in Russia (-41 bcm) and the US (-15 bcm).

Natural gas: Consumption per capita 2020

GJ per capita



Prices

US dollars per million Btu	LNG		Natural gas					Crude oil OECD countries CIF ⁶
	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) ⁵	
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	1.58	8.97
2018	10.05	9.76	6.66	8.06	7.90	3.12	1.18	11.68
2019	9.94	5.49	5.03	4.47	4.45	2.51	1.27	10.82
2020	7.81	4.39	4.06	3.42	3.07	1.99	1.58	7.19

¹Source: EDMC Energy Trend.

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

³Source: 1986-1990 German Federal Statistical Office, 1991-2020 German Federal Office of Economics and Export Control (BAFA).

⁴Source: ICIS Heren Energy Ltd.

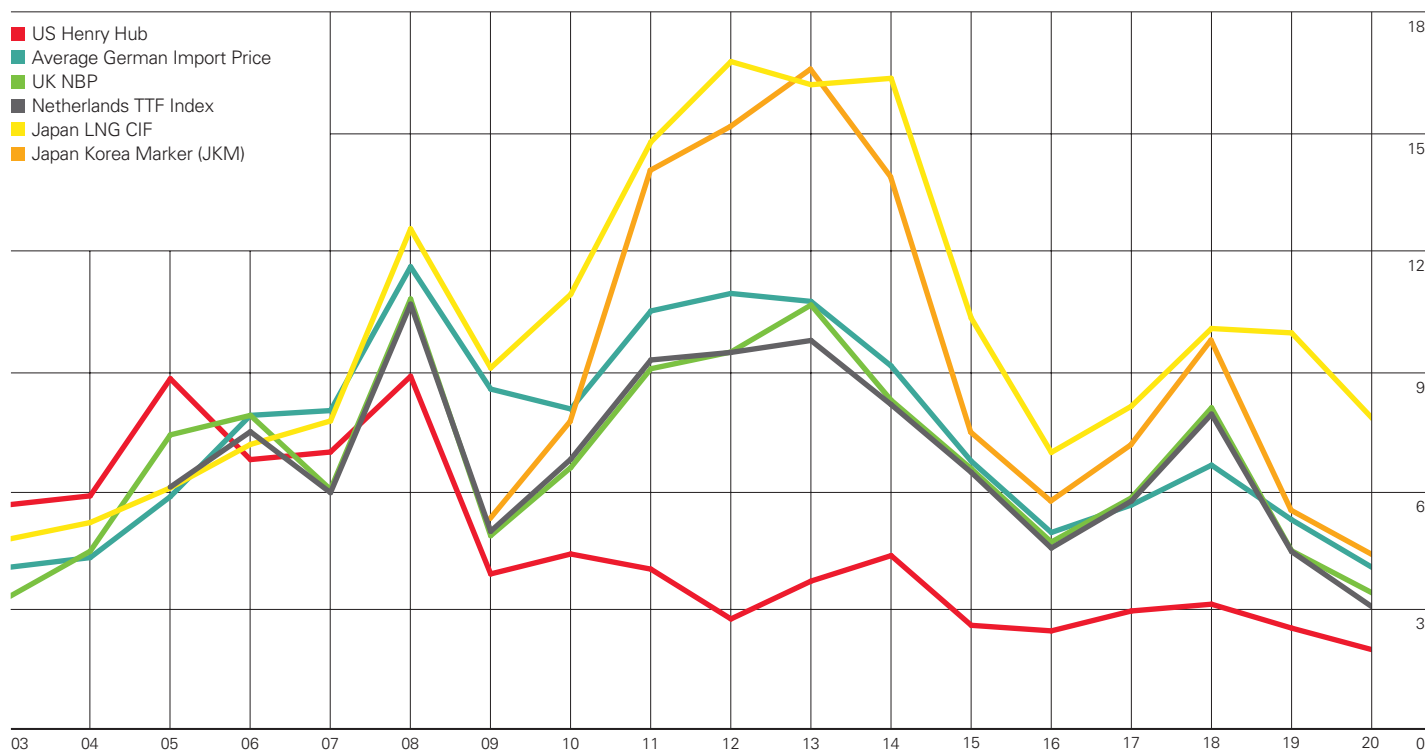
⁵Source: Energy Intelligence Group, *Natural Gas Week*.

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

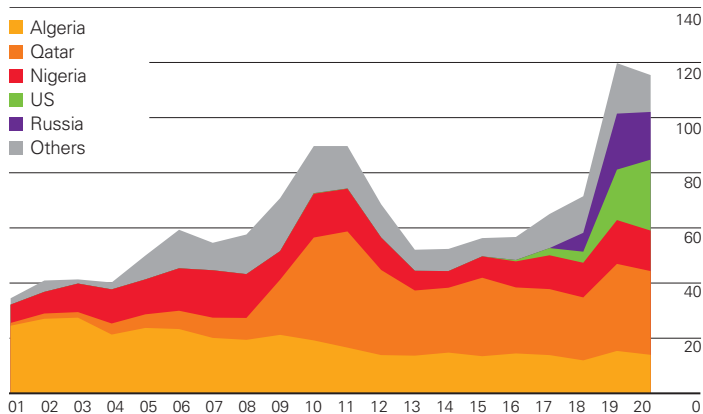
Billion cubic metres	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Growth rate per annum		Share 2020
												2020	2009-19	
Canada	2.0	3.2	1.6	1.0	0.5	0.6	0.3	0.4	0.6	0.5	0.8	56.1%	-6.1%	0.2%
Mexico	6.1	3.8	4.9	7.8	9.3	6.8	5.6	6.6	6.9	6.6	2.5	-62.0%	5.8%	0.5%
US	12.1	9.9	4.9	2.7	1.7	2.5	2.4	2.2	2.1	1.5	1.3	-12.3%	-19.3%	0.3%
Total North America	20.2	16.8	11.4	11.4	11.5	10.0	8.3	9.2	9.6	8.6	4.6	-46.0%	-6.8%	1.0%
Argentina	1.9	3.7	4.7	6.3	6.2	5.6	5.1	4.6	3.6	1.8	1.8	0.7%	5.7%	0.4%
Brazil	2.8	0.7	3.5	5.2	7.1	6.8	2.6	1.7	2.9	3.2	3.3	3.4%	22.6%	0.7%
Chile	3.1	3.7	4.0	3.8	3.5	3.7	4.5	4.4	4.3	3.3	3.7	9.6%	17.3%	0.8%
Other S. & Cent. America	1.4	1.9	2.4	2.8	2.8	2.8	3.0	2.8	3.7	4.8	5.1	5.5%	13.3%	1.0%
Total S. & Cent. America	9.2	9.9	14.6	18.1	19.6	18.9	15.2	13.5	14.5	13.1	13.9	5.4%	14.2%	2.8%
Belgium	6.5	6.3	4.1	3.1	2.9	3.6	2.4	1.3	3.3	7.2	5.1	-29.8%	0.5%	1.0%
France	14.7	14.4	9.8	8.3	6.9	6.4	9.1	10.9	12.7	23.0	19.6	-15.1%	5.6%	4.0%
Italy	9.3	9.1	7.1	5.8	4.5	5.9	5.9	8.2	8.2	13.5	12.1	-10.7%	16.1%	2.5%
Spain	28.2	23.9	21.4	15.7	16.2	13.7	13.8	16.6	15.0	21.9	20.9	-5.1%	-2.2%	4.3%
Turkey	7.8	5.9	7.6	5.9	7.1	7.5	7.6	10.9	11.4	12.9	14.8	14.9%	8.0%	3.0%
United Kingdom	18.8	24.7	13.9	9.2	11.2	13.7	10.7	6.6	7.2	17.1	18.6	8.2%	5.4%	3.8%
Other EU	3.9	4.9	4.4	3.7	3.3	5.2	6.9	10.2	13.4	23.4	23.7	1.1%	20.2%	4.9%
Rest of Europe	†	-	†	-	†	-	-	0.1	-	-	0.1	n/a	n/a	♦
Total Europe	89.1	89.2	68.2	51.8	52.1	56.0	56.4	64.7	71.3	119.1	114.8	-3.8%	5.4%	23.5%
Egypt	-	-	-	-	-	3.9	10.7	8.3	3.2	-	-	n/a	n/a	-
Kuwait	2.8	3.0	2.8	2.3	3.6	4.3	4.7	4.8	4.3	5.1	5.7	10.6%	18.6%	1.2%
United Arab Emirates	0.2	1.4	1.4	1.6	1.6	2.9	4.2	3.0	1.0	1.6	1.6	-4.3%	n/a	0.3%
Other Middle East & Africa	-	-	-	0.5	0.1	2.7	4.8	5.3	4.0	2.7	1.9	-28.3%	n/a	0.4%
Total Middle East & Africa	3.0	4.4	4.2	4.3	5.3	13.7	24.5	21.4	12.5	9.4	9.2	-3.1%	26.0%	1.9%
China	13.0	16.9	20.1	25.1	27.3	27.0	36.8	52.9	73.5	84.7	94.0	10.6%	26.6%	19.3%
India	11.5	17.4	18.4	18.0	19.1	20.0	24.3	26.1	30.6	32.4	35.8	10.2%	9.6%	7.3%
Japan	96.4	108.6	119.8	120.4	121.8	115.9	113.6	113.9	113.0	105.5	102.0	-3.6%	1.7%	20.9%
Malaysia	-	-	-	2.0	2.2	2.2	1.5	2.0	1.8	3.3	3.6	9.3%	n/a	0.7%
Pakistan	-	-	-	-	-	1.5	4.0	6.1	9.4	11.8	10.6	-10.0%	n/a	2.2%
Singapore	-	-	-	1.3	2.6	3.0	3.2	4.1	4.5	5.0	5.7	15.3%	n/a	1.2%
South Korea	45.0	47.7	49.7	55.3	51.8	45.8	46.3	51.4	60.2	55.6	55.3	-0.9%	4.6%	11.3%
Taiwan	15.0	16.3	17.1	17.2	18.6	19.6	20.4	22.7	22.9	22.8	24.7	8.0%	6.3%	5.1%
Thailand	-	1.1	1.4	2.0	1.9	3.6	3.9	5.2	6.0	6.7	7.5	11.4%	n/a	1.5%
Other Asia Pacific	-	-	0.1	-	-	-	-	0.8	5.7	5.7	6.1	6.4%	n/a	1.3%
Total Asia Pacific	180.9	207.9	226.6	241.2	245.2	238.5	253.9	284.6	322.7	333.6	345.4	3.3%	7.8%	70.8%
Total LNG imports	302.4	328.3	324.9	326.8	333.6	337.1	358.3	393.3	430.6	483.8	487.9	0.6%	6.8%	100.0%

Gross LNG trade †Less than 0.05%.
 †Less than 0.05%. n/a not available.
 ♦Less than 0.05%.

Source: includes GIGNL, IHS Markit.

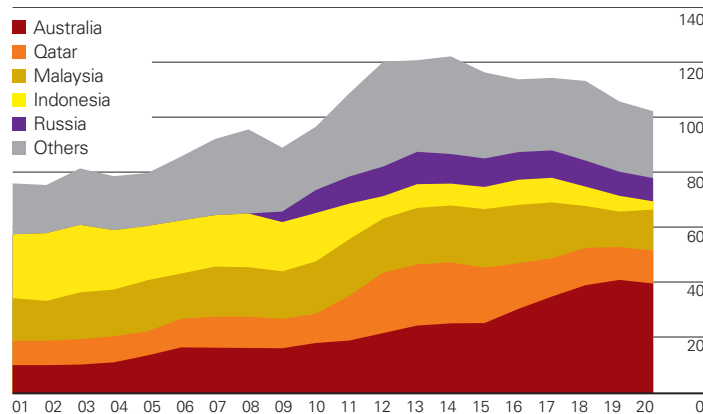
LNG imports by source: Europe

Billion cubic metres



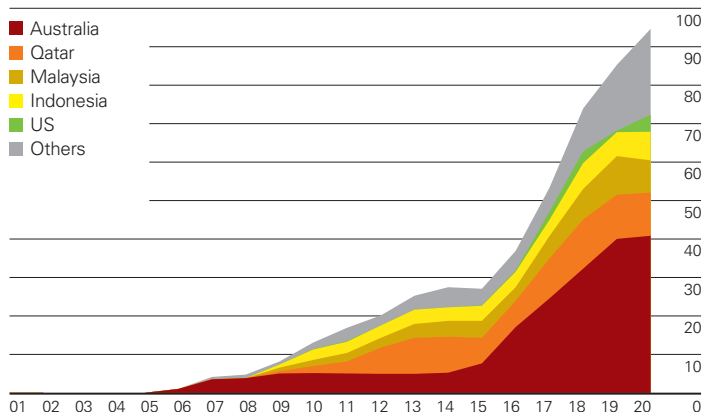
LNG imports by source: Japan

Billion cubic metres



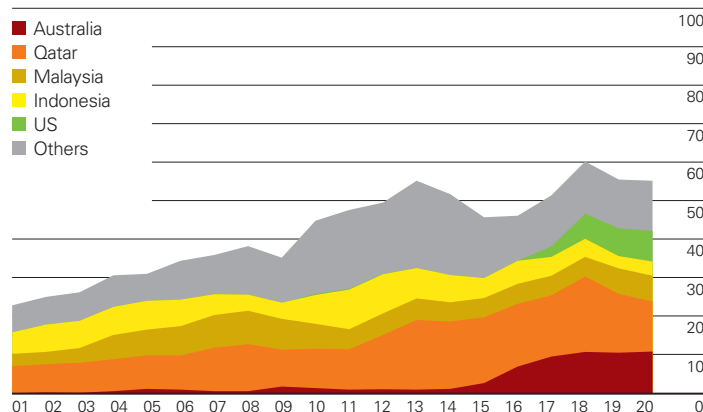
LNG imports by source: China

Billion cubic metres



LNG imports by source: South Korea

Billion cubic metres



Total proved reserves at end 2020

Million tonnes	Anthracite and bituminous	Sub-bituminous and lignite	Total	Share of Total	R/P ratio
Canada	4346	2236	6582	0.6%	166
Mexico	1160	51	1211	0.1%	185
US	218938	30003	248941	23.2%	*
Total North America	224444	32290	256734	23.9%	484
Brazil	1547	5049	6596	0.6%	*
Colombia	4554	–	4554	0.4%	90
Venezuela	731	–	731	0.1%	*
Other S. & Cent. America	1784	24	1808	0.2%	*
Total S. & Cent. America	8616	5073	13689	1.3%	240
Bulgaria	192	2174	2366	0.2%	192
Czech Republic	1081	2514	3595	0.3%	113
Germany	–	35900	35900	3.3%	334
Greece	–	2876	2876	0.3%	205
Hungary	276	2633	2909	0.3%	475
Poland	22530	5865	28395	2.6%	282
Romania	11	280	291	♦	19
Serbia	402	7112	7514	0.7%	189
Spain	868	319	1187	0.1%	282
Turkey	550	10975	11525	1.1%	168
Ukraine	32039	2336	34375	3.2%	*
United Kingdom	26	–	26	♦	16
Other Europe	1109	5172	6281	0.6%	189
Total Europe	59084	78156	137240	12.8%	299
Kazakhstan	25605	–	25605	2.4%	226
Russian Federation	71719	90447	162166	15.1%	407
Uzbekistan	1375	–	1375	0.1%	333
Other CIS	1509	–	1509	0.1%	336
Total CIS	100208	90447	190655	17.8%	367
South Africa	9893	–	9893	0.9%	40
Zimbabwe	502	–	502	♦	153
Other Africa	4376	66	4442	0.4%	280
Middle East	1203	–	1203	0.1%	*
Total Middle East & Africa	15974	66	16040	1.5%	60
Australia	73719	76508	150227	14.0%	315
China	135069	8128	143197	13.3%	37
India	105979	5073	111052	10.3%	147
Indonesia	23141	11728	34869	3.2%	62
Japan	340	10	350	♦	453
Mongolia	1170	1350	2520	0.2%	58
New Zealand	825	6750	7575	0.7%	*
Pakistan	207	2857	3064	0.3%	396
South Korea	326	–	326	♦	320
Thailand	–	1063	1063	0.1%	80
Vietnam	3116	244	3360	0.3%	69
Other Asia Pacific	1421	726	2147	0.2%	33
Total Asia Pacific	345313	114437	459750	42.8%	78
Total World	753639	320469	1074108	100.0%	139
of which: OECD	331303	177130	508433	47.3%	363
Non-OECD	422336	143339	565675	52.7%	90
European Union	25539	53051	78590	7.3%	266

*More than 500 years.

♦Less than 0.05%.

Source: Federal Institute for Geosciences and Natural Resources (BGR) Energy Study 2021.

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.

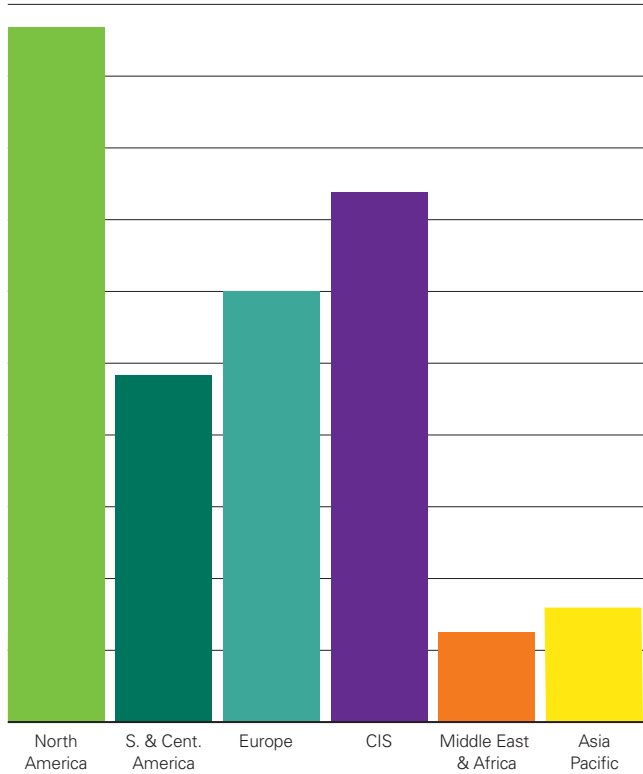
Reserves-to-production (R/P) ratios are calculated excluding other solid fuels in reserves and production.

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

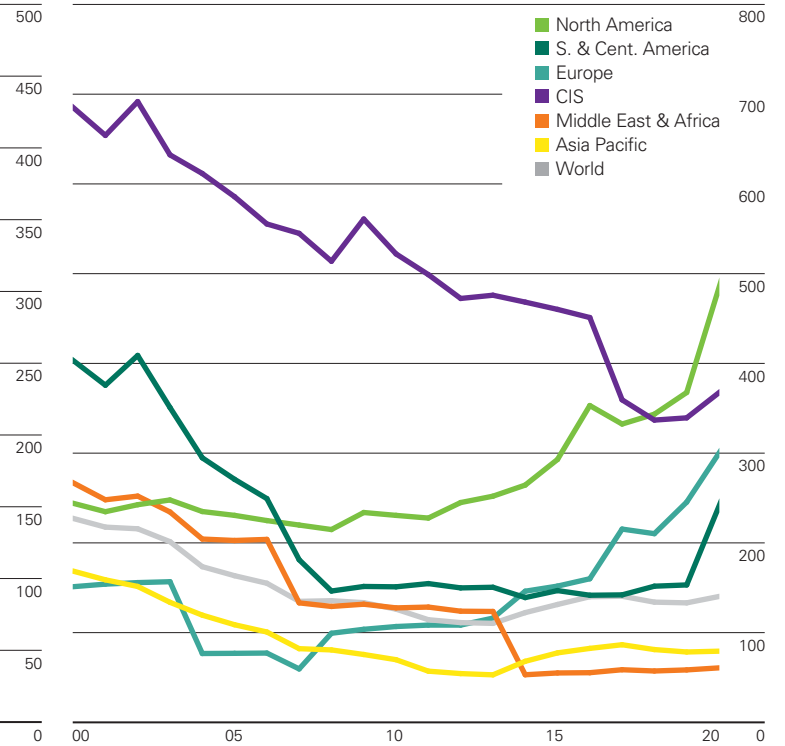
Reserves-to-production (R/P) ratios

Years

2020 by region



History

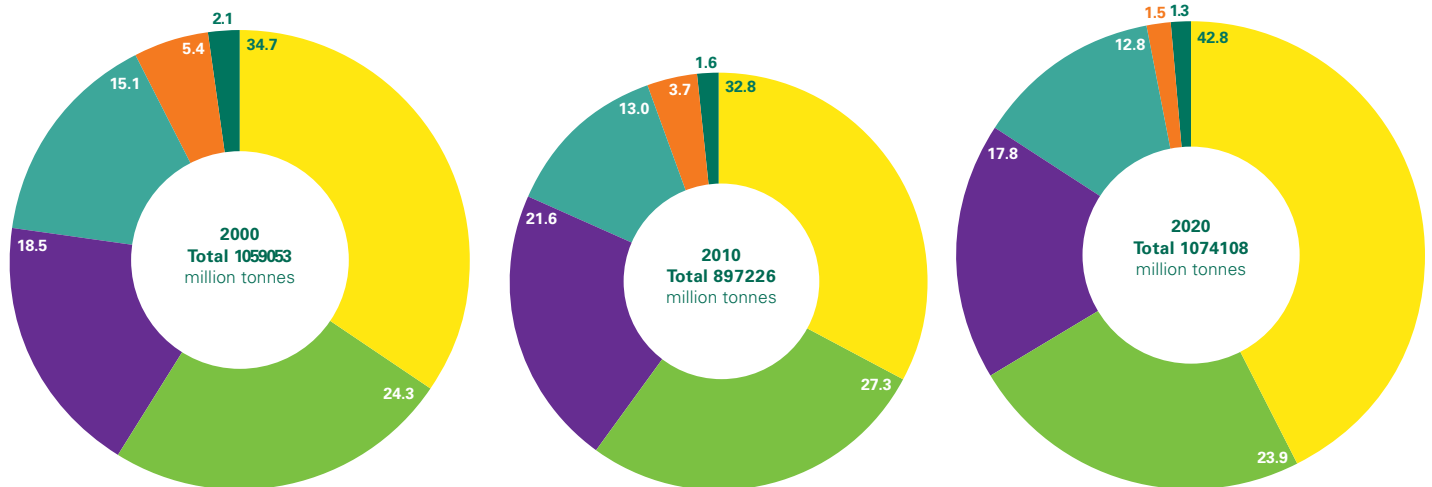


World coal reserves in 2020 stood at 1074 billion tonnes and are heavily concentrated in just a few countries: US (23%), Russia (15%), Australia (14%) and China (13%). Most of the reserves are anthracite and bituminous (70%). The current global R/P ratio shows that coal reserves in 2020 accounted for 139 years of current production with North America (484 years) and CIS (367 years) the regions with the highest ratios.

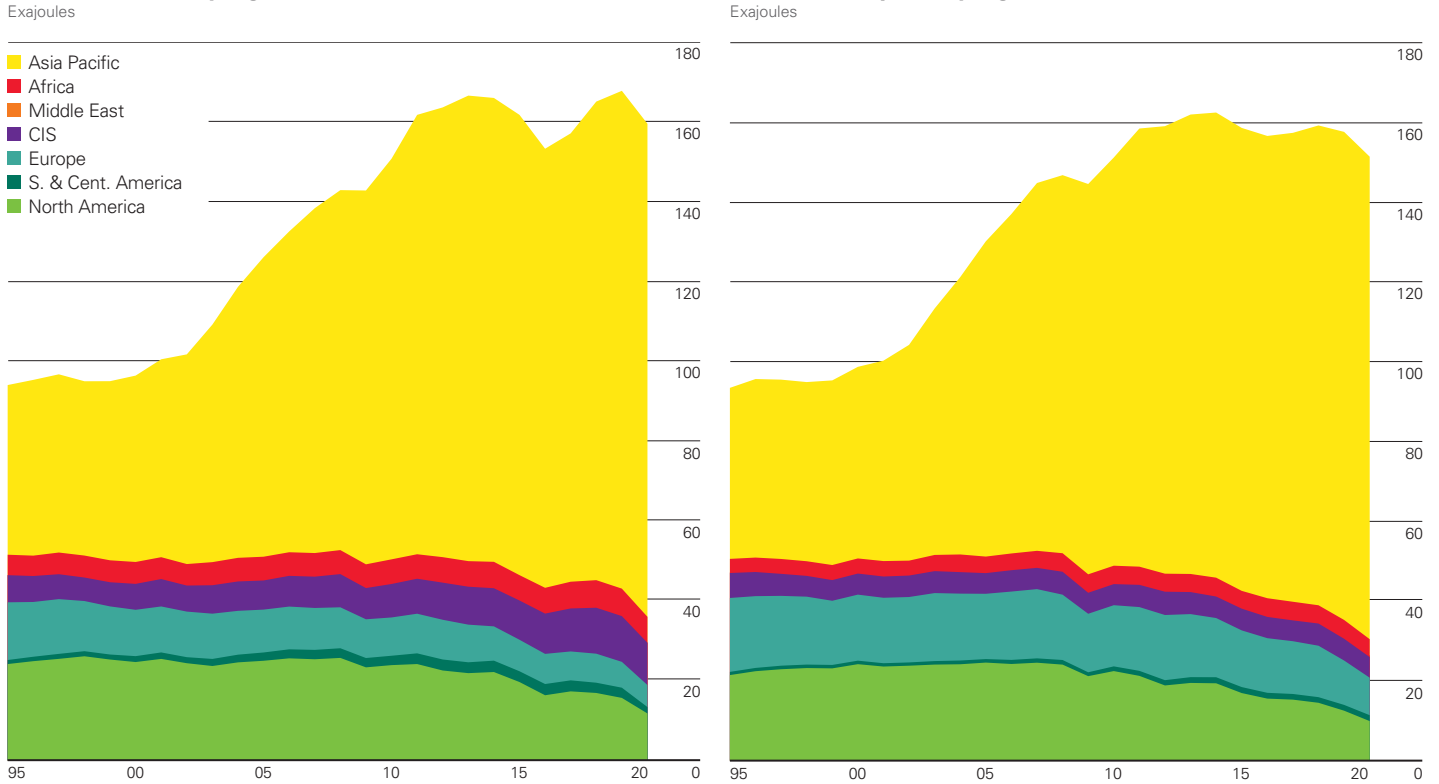
Distribution of proved reserves in 2000, 2010 and 2020

Percentage

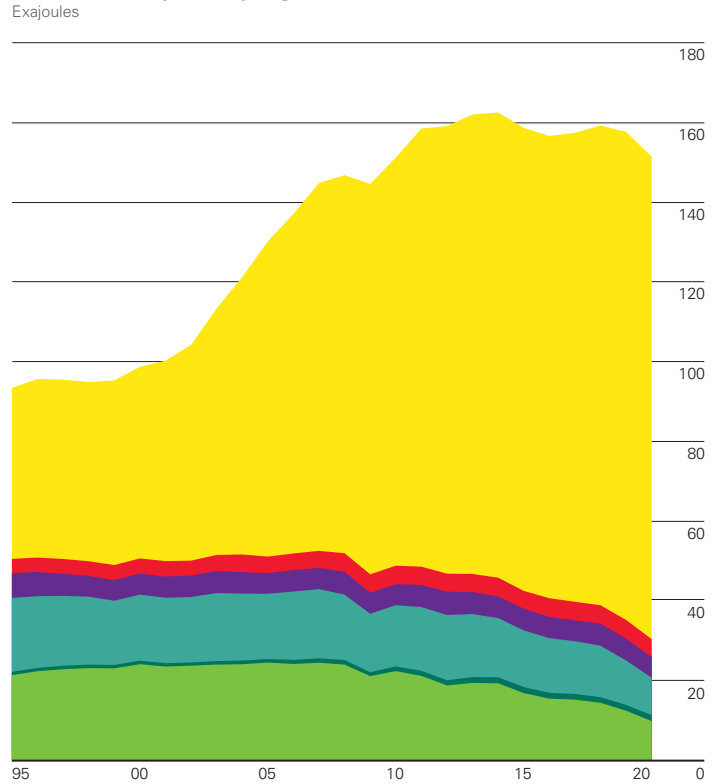
- Asia Pacific
- North America
- CIS
- Europe
- Middle East & Africa
- S. & Cent. America



Coal: Production by region



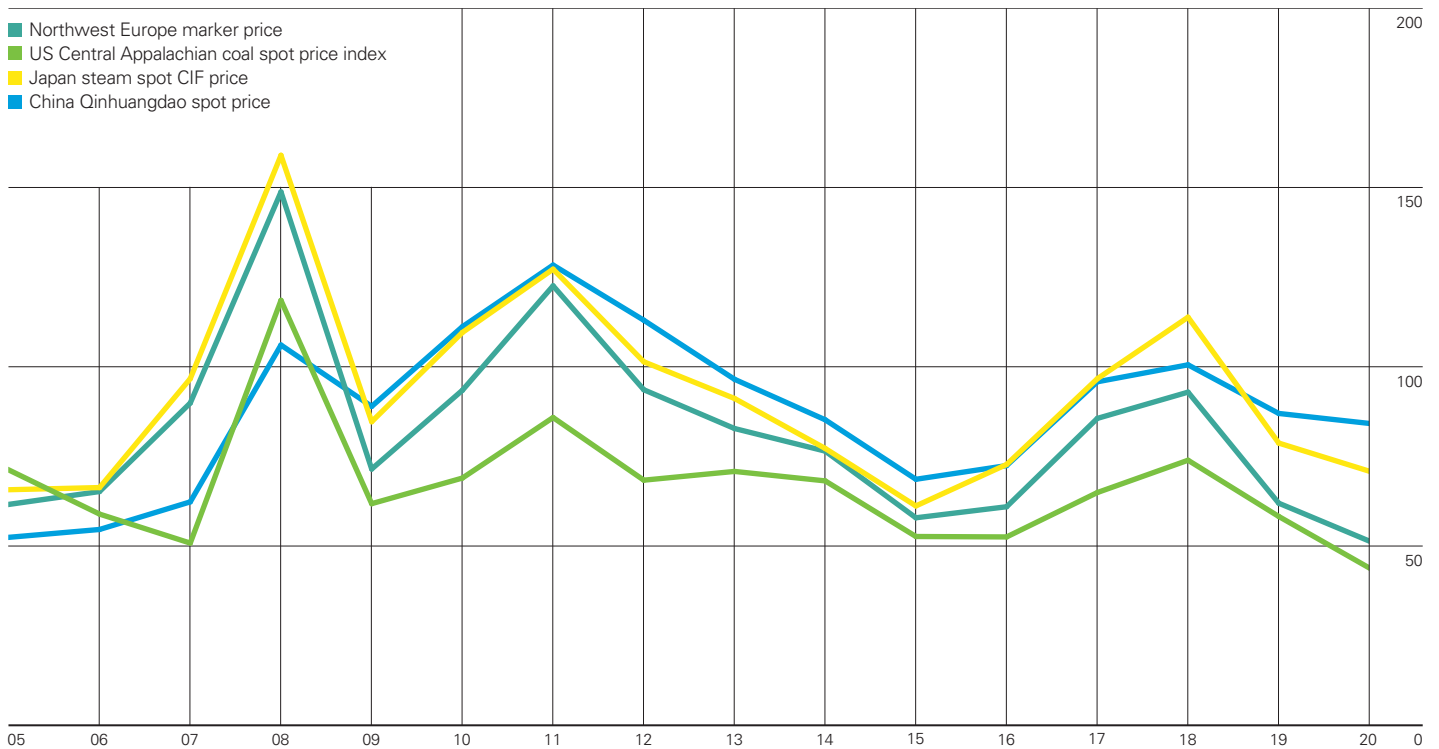
Coal: Consumption by region



World coal consumption fell by 4.2%, its fourth decline in six years. In the non-OECD, the only notable increases in consumption were in China (0.3%) and Malaysia (18.7%), while significant consumption declines were recorded for India (-6.0%) and Indonesia (-4.9%). OECD demand fell sharply, led by the US (-19.1%) and South Korea (-12.2%), to the lowest level in our data series (which goes back to 1965). Global coal production declined by -5.2%, with China providing the only significant increase (1.2%). The largest declines in production also came from the US (-25.2%) and Indonesia (-9.0%).

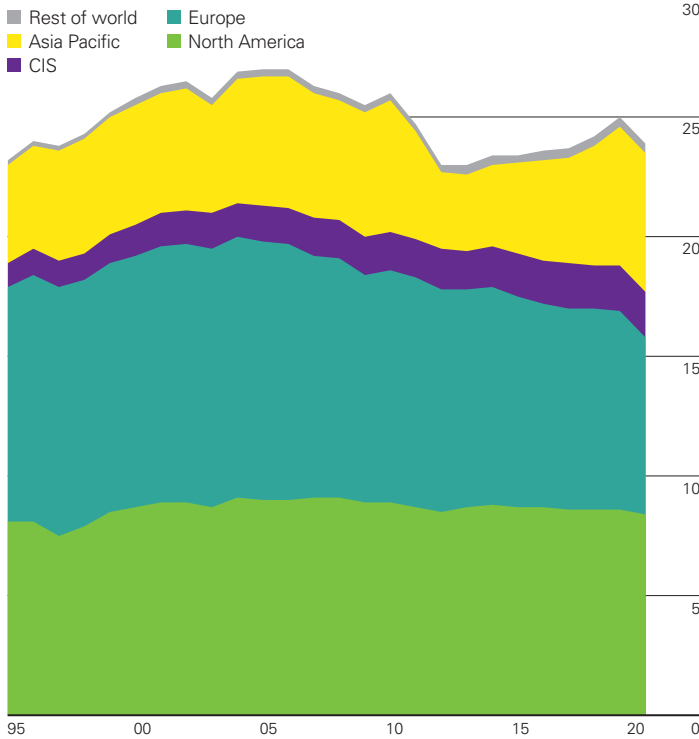
Coal prices

US dollars per tonne



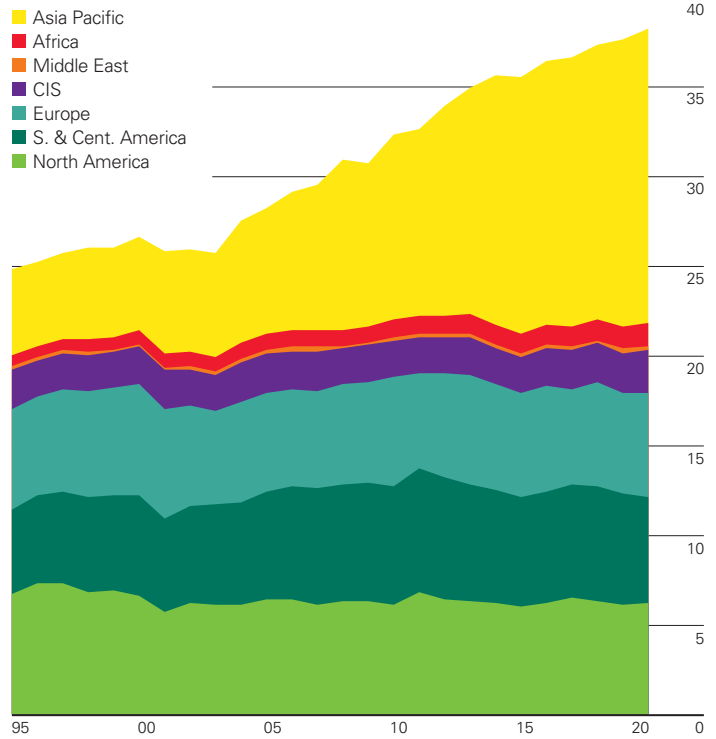
Nuclear energy consumption by region

Exajoules



Hydroelectricity consumption by region

Exajoules

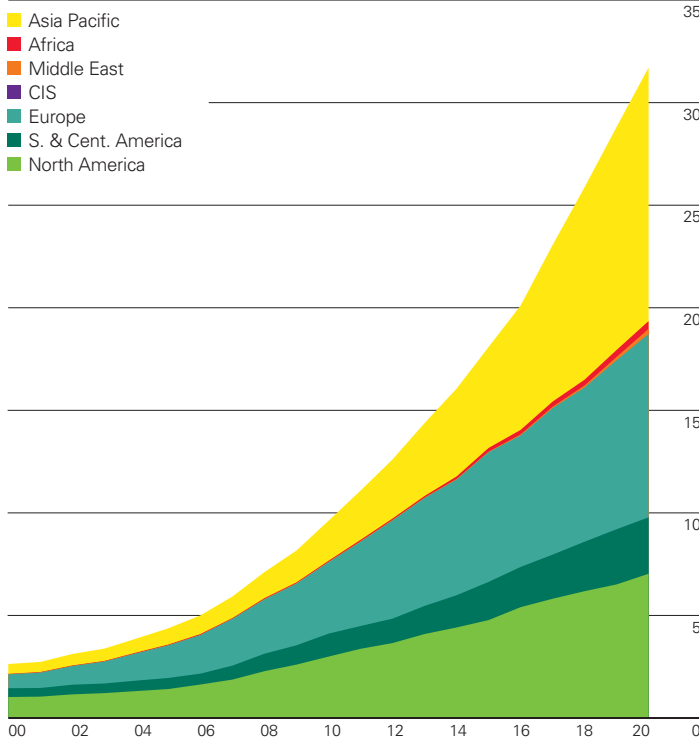


Nuclear consumption fell by 4.1% (on an input-equivalent basis), its sharpest decline since the Fukushima-related decline in 2011 and 2012. COVID-19 and the associated economic shock drove power generation lower, and nuclear generation fell the most in France (-0.4 EJ) and the US (-0.2 EJ).

Hydroelectric consumption rose by 1%, below the 10-year average of 2.1%. Growth was led by China (0.4 EJ) and Russia (0.2 EJ), while hydro consumption fell across the South & Central America region.

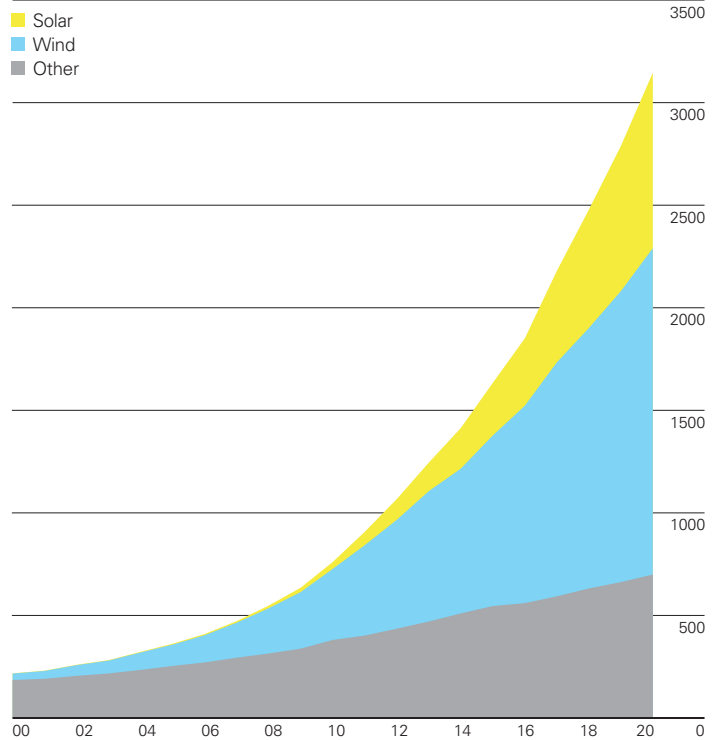
Renewables consumption by region

Exajoules



Renewables generation by source

Terawatt-hours

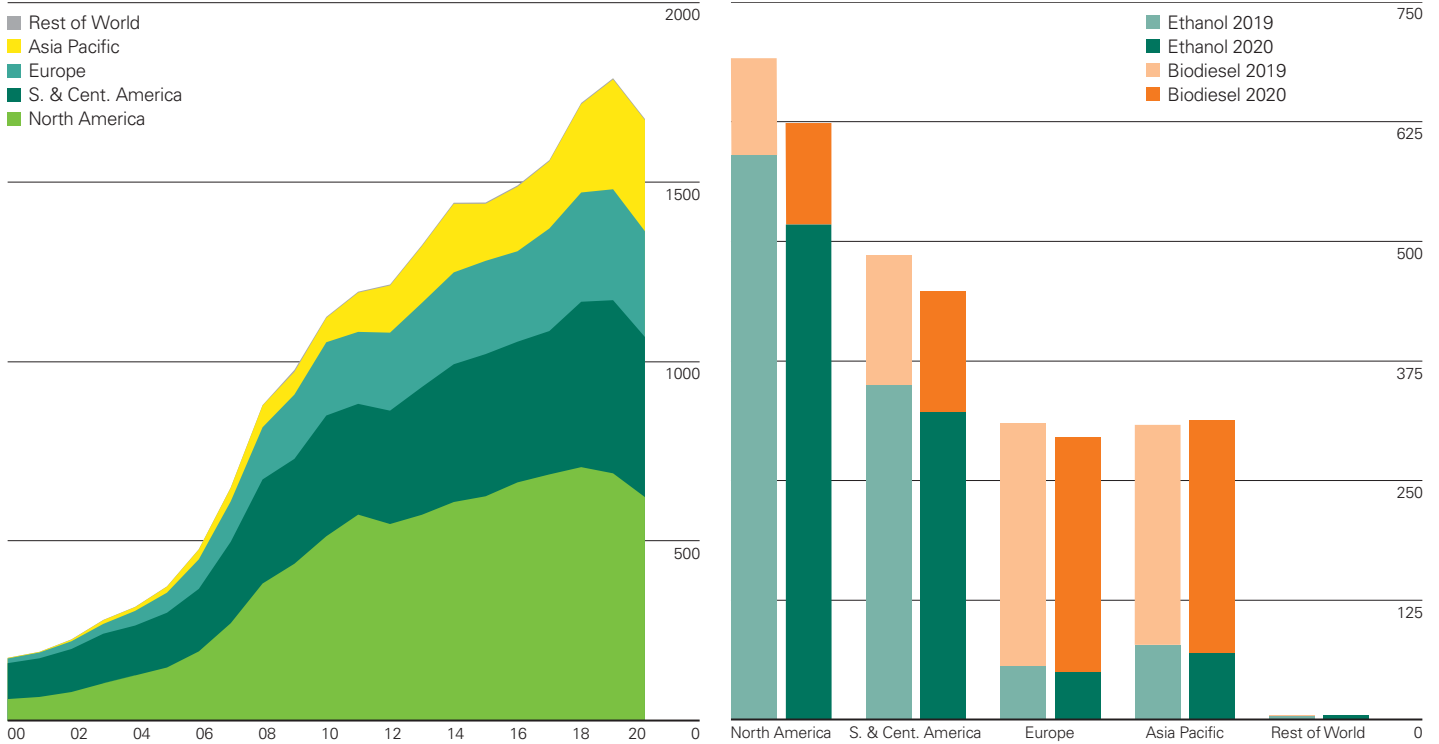


Renewable energy consumption (including biofuels but excluding hydro) grew by 2.9 EJ. The annual growth rate of 9.7% was below the historical 10-year average but the absolute increase in energy terms was roughly in-line with the last 4 years and the largest for any fuel in 2020. By country, China was by far the largest contributor to renewables growth (1.0 EJ), followed by the US (0.4 EJ), then Japan, the United Kingdom, India and Germany (all 0.1 EJ).

Wind provided the largest contribution to the growth of renewables electricity generation (173 TWh) followed closely by solar (148 TWh). The share of solar in the power generation mix has continually increased over the last 10 years and solar now comprises 27% of renewable generation, albeit just 3.2% of total power generation.

World biofuels production

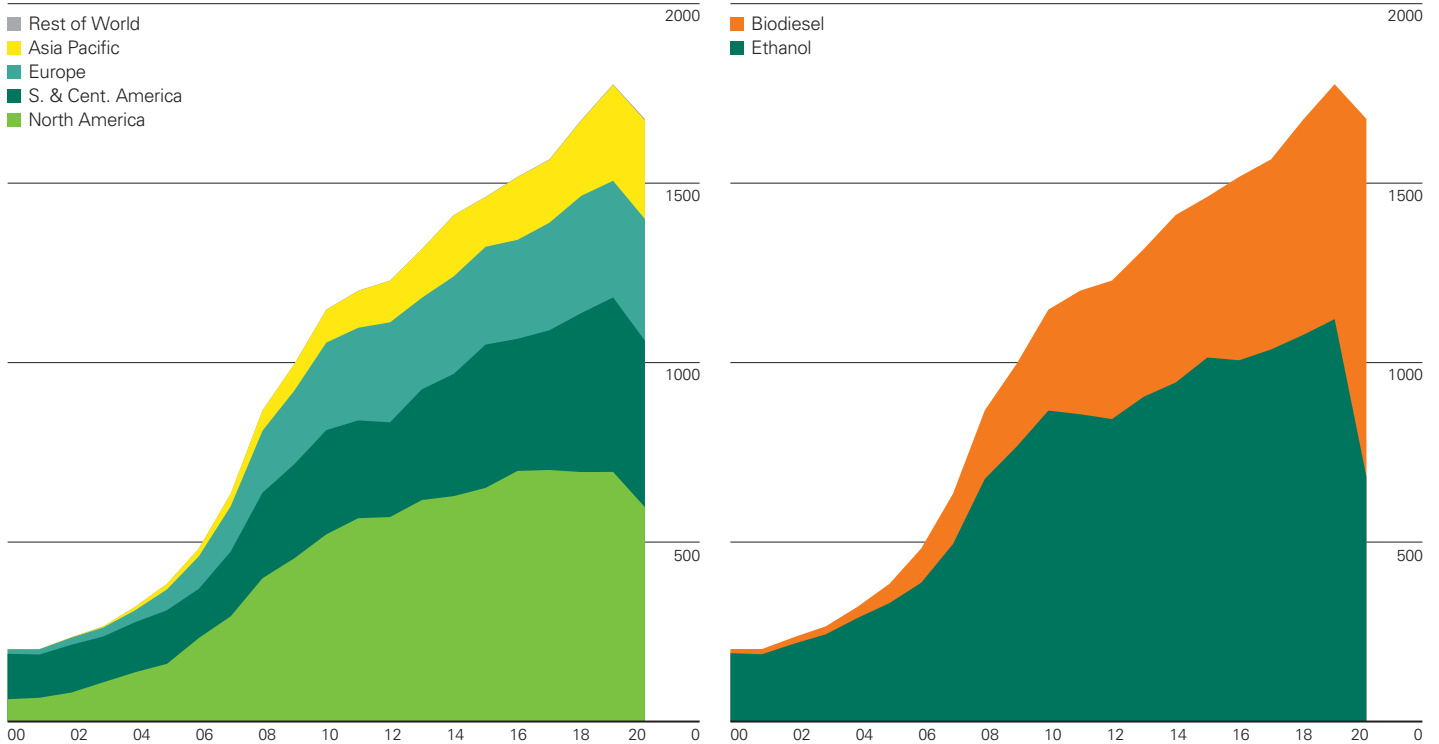
Thousand barrels of oil equivalent per day



Biofuels production fell 6% globally in 2020 (113,000 barrels of oil equivalent per day or boe/d) in contrast to the 6% average growth for the 10 years prior. Moderate growth in Asia (4,000 boe/d) was more than compensated by a decline in the US (64,000 boe/d), Argentina (19,000 boe/d) and Brazil (16,000 boe/d). Asia's production was resilient due to an increase in biodiesel whereas ethanol production decreased in all major regions by 7 to 12% (107,000 boe/d globally). Biodiesel is the dominant fuel produced in Europe and Asia Pacific (making up 83% and 77% of biofuels respectively in 2020), while ethanol is the main fuel in North America (83% of total) and South and Central America (72%).

World biofuels consumption

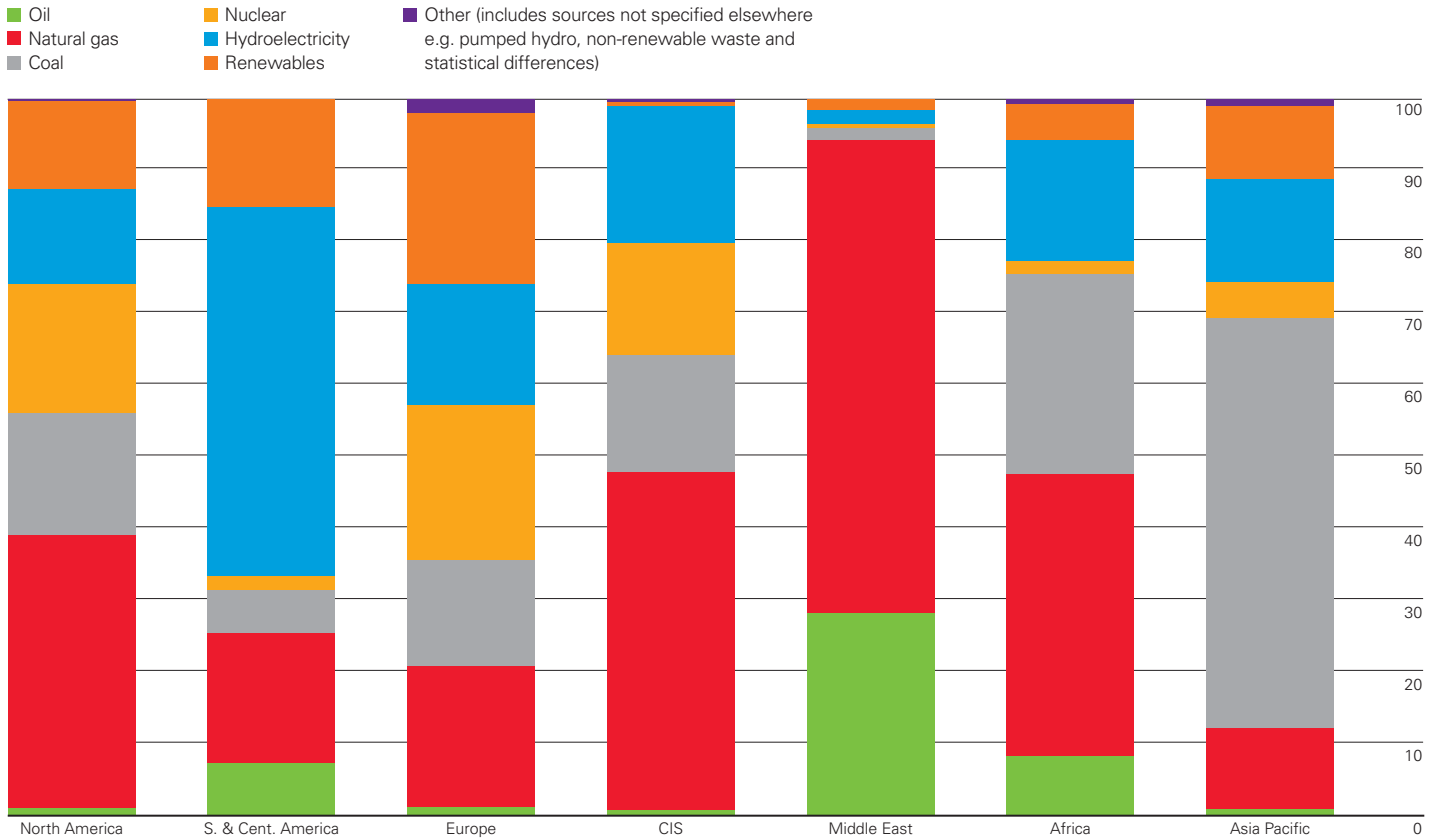
Thousand barrels of oil equivalent per day



Biofuels consumption fell by 5% (92,000 boe/d). As with production, the decline was largest in the US (68,000 boe/d), most of which was ethanol, but also in Argentina (13,000 boe/d), due to reduced biodiesel consumption. European biofuel consumption grew 1% in 2020 (3,000 boe/d). At the global level, ethanol made up 59% of biofuels in 2019, but the share of biodiesel has risen continually. For example, biodiesel's share was 26% in 2010 but rose to 41% last year.

Regional electricity generation by fuel 2020

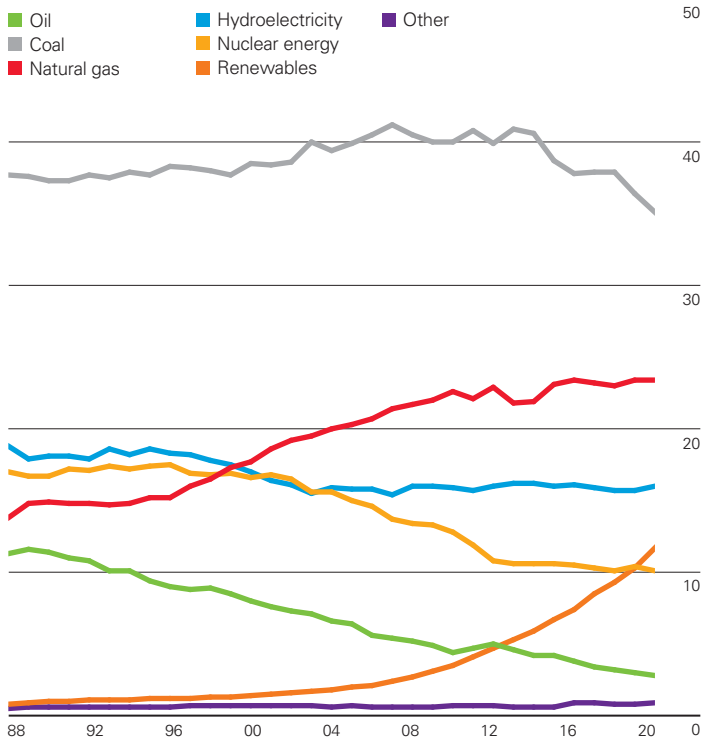
Percentage



Natural gas is the dominant fuel used for power generation in North America, CIS, the Middle East and Africa. More than half of the power in South and Central America is hydroelectricity, while in Asia, coal comprises 57% of the generation mix – a far higher share than any other region. In Europe, renewables (including biopower) are the largest source of power generation with 23.8% for the first time, overtaking nuclear on 21.6%. Generation in Europe is spread fairly evenly between renewables, nuclear, gas (19.6%) and hydro (16.9%).

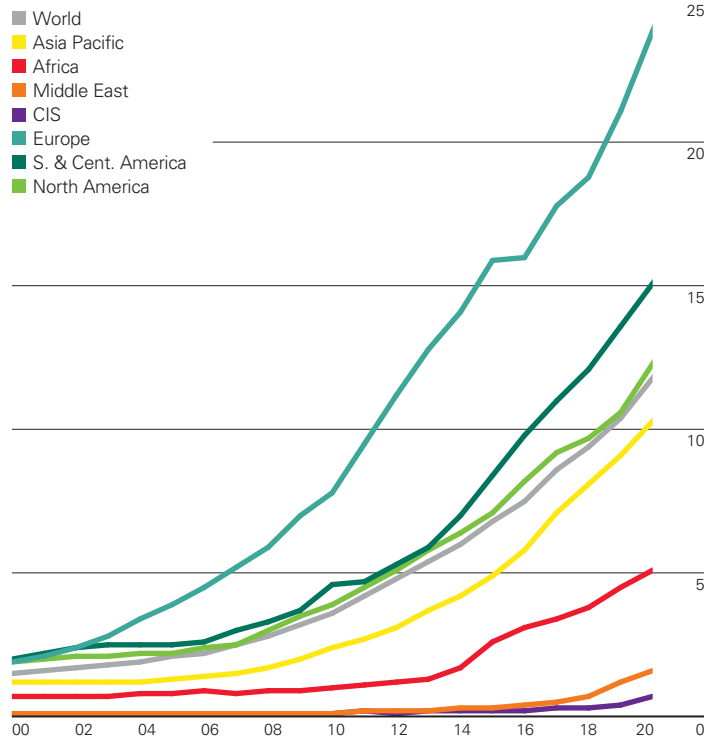
Share of global electricity generation by fuel

Percentage



Renewables share of power generation by region

Percentage



At a global level, coal is the dominant fuel for power generation, however its share fell 1.3 percentage points to 35.1% in 2020, the lowest level in our data series. The share of renewables rose to record levels last year (11.7%), with the combined share of renewables and gas-fired power (35.1%) equalling coal for the first time. Europe's share of renewables in power generation reached 23.8%, surpassing nuclear energy and making Europe the first region where renewables are the dominant source of power generation.

Reserves of key minerals

Cobalt reserves

Thousand tonnes	At end of 2020	Share	R/P ratio
Australia	1400	20.3%	247
Canada	220	3.2%	69
China	80	1.2%	35
Cuba	500	7.2%	107
Democratic Republic of Congo	3600	52.2%	42
Madagascar	100	1.4%	143
Morocco	14	0.2%	7
New Caledonia	64	0.9%	94
Papua New Guinea	51	0.7%	18
Philippines	260	3.8%	58
Russian Federation	250	3.6%	40
South Africa	40	0.6%	22
Zambia	270	3.9%	63
Rest of World*	53	0.8%	17
Total World	6902	100.0%	54

Natural graphite reserves

Thousand tonnes	At end of 2020	Share	R/P ratio
Brazil	70000	20.0%	737
Canada	n/a	n/a	n/a
China	73000	20.9%	112
India	8000	2.3%	235
Madagascar	26000	7.4%	895
Mexico	3100	0.9%	1948
Mozambique	25000	7.2%	2083
Norway	600	0.2%	40
Russian Federation	25703	7.4%	1469
Sri Lanka	1500	0.4%	428.6
Turkey	90000	25.8%	9009.0
Ukraine	n/a	n/a	n/a
Rest of World*	26600	7.6%	1893
Total World	349503	100.0%	385

Lithium reserves

Thousand tonnes	At end of 2020	Share	R/P ratio
Argentina	1900	10.0%	306
Australia	4700	24.8%	118
Brazil	95	0.5%	50
Chile	9200	48.5%	446
China	1500	7.9%	107
Portugal	60	0.3%	67
US	750	4.0%	833
Zimbabwe	220	1.2%	183
Rest of World*	530	2.8%	994
Total World	18955	100%	220

Rare earth metals reserves

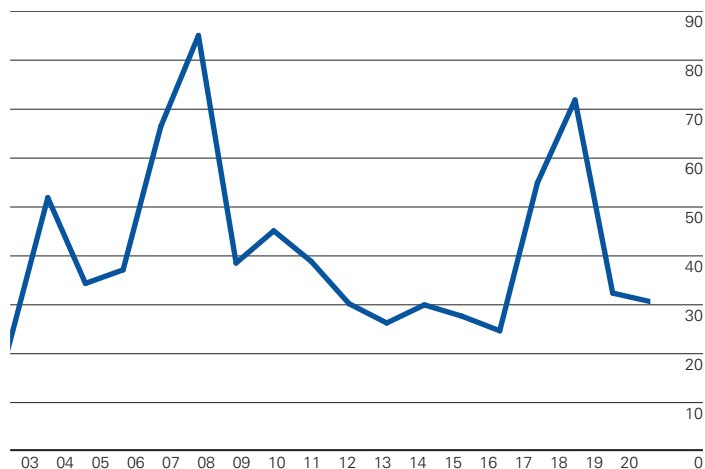
Thousand tonnes	At end of 2020	Share	R/P ratio
Australia	4100	3.3%	99
Brazil	21000	16.9%	21000
China	44000	35.4%	314
India	6900	5.6%	2300
Madagascar	n/a	n/a	n/a
Russian Federation	20602	16.6%	7924
Thailand	n/a	n/a	n/a
US	1500	1.2%	39
Rest of World*	26040	21.0%	824
Total World	124142	100.0%	464

*Rest of World is the sum of only recorded reserves.
n/a not available.

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

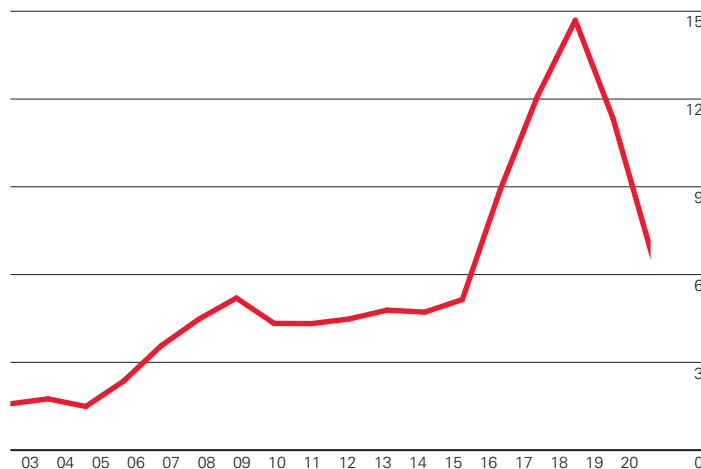
Cobalt prices

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.

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%	2011	38.6%
2001	36.2%	2012	38.8%
2002	36.5%	2013	39.1%
2003	36.7%	2014	39.3%
2004	36.9%	2015	39.5%
2005	37.2%	2016	39.8%
2006	37.4%	2017	40.0%
2007	37.6%	2018	40.2%
2008	37.9%	2019	40.4%
2009	38.1%	2020	40.5%
2010	38.4%		

For more details on the change in methodology please go to 'about 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.

Asia Pacific

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

[†]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, Colombia, 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: 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.

Non-OECD

All countries that are not members of the OECD.

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