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Escuela de Ingeniería Mecánica Automotriz

**Artículo Investigación para la obtención del Título de Ingeniero(a) en Mecánica
Automotriz**

Concepto multi-inyector para motores de combustión interna

Nombre de los Autores:

**Germán Francisco Erazo Caicedo
Jonathan Daniel Valladares Vélez**

Director:

PhD. Marcos Xavier Gutiérrez Ojeda

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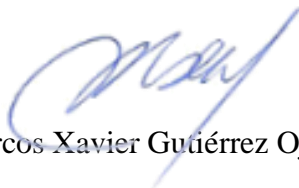


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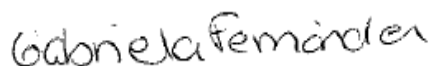
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DEDICATORIA

A Dios y a nuestros Padres.

AGRADECIMIENTO

A nuestros profesores y a la Universidad Internacional del Ecuador.

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MÉTODO PARA EVALUAR FLUJOS DE ATOMIZACIÓN DE COMBUSTIBLE

Germán Erazo¹, Jonathan Valladares², Marcos Gutiérrez³

¹geerazoca@uide.edu.ec, Quito – Ecuador

²jovalladaresve@uide.edu.ec, Quito – Ecuador

³magutierrezoj@uide.edu.ec, Quito – Ecuador

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Resumen

El concepto multi inyector del presente trabajo se ha probado experimentalmente en condiciones no reactivas, con la directa interacción de uno, dos y cuatros sprays. A diferencia de lo que sugiere la literatura, la colisión de los sprays no coaliciona las partículas atomizadas de fluido, sino que debido a la energía cinética con la que interactúan, incluso se forman vórtices, los mismos que favorecen la mejor distribución y mezclado con el aire del combustible. La interacción de los sprays se registró en video y posteriormente se hizo un análisis computarizado de imágenes, para verificar el nivel de atomización, zonas de densidad del fluido y la distribución espacial de fluido atomizado. El mayor efecto del proceso de atomización se obtuvo con cuatro inyectores, dando lugar a replantearse la posibilidad, necesidad y urgencia de una reingeniería de los motores de combustión interna y de los sistemas de inyección de combustible, en especial para aquellos motores diésel y de gasolina con inyección directa..

Palabras clave: flujo de atomización, análisis por imagen, Python, PIL, ImageChops, ImageChops.difference, OpenFOAM..

Abstract

The multi-injector concept of the present work has been experimentally tested under non-reactive conditions, with the direct interaction of one, two and four sprays. Contrary to what the literature suggests, the collision of the sprays does not coalesce the atomized fluid particles, but due to the kinetic energy with which they interact, even vortices are formed, which favor better distribution and mixing with the fuel air. The interaction of the sprays was recorded on video and later a computerized image analysis was performed to verify the level of atomization, fluid density zones and the spatial distribution of the atomized fluid. The greatest effect of the atomization process was obtained with four injectors, leading to rethink the possibility, necessity and urgency of a reengineering of internal combustion engines and fuel injection systems, especially for those diesel and gasoline engines with direct injection.

Keywords: atomization flow, image analysis, Python, PIL, ImageChops, ImageChops.difference, OpenFOAM..

1. INTRODUCCION

El consumo primario de energía entre el año 2009 y el 2019 se incrementó de 482.82 EJ a 583.90 EJ, con un crecimiento anual del 1.92%. La energía generada, proviene en su mayoría de combustibles fósiles, exactamente hasta un 79.9% en el año 2017 [1,2]. Con una participación tan grande de los combustibles fósiles tanto para la generación de energía como para su uso en el transporte, se crea la necesidad inmediata de optimizar las facilidades existentes, entre esas y en especial, los motores de combustión interna. La reingeniería de los sistemas de inyección de combustible genera un considerable interés, en lo que se refiere al potencial de atomizar mejor el combustible.

Mientras los principios de funcionamiento de los motores de combustión interna y de los sistemas de inyección de combustible han permanecido prácticamente sin cambios, el desarrollo de combustibles alternativos ha crecido a un ritmo mayor. Uno de los mayores retos ha sido el de lograr una atomización de combustible equivalente con un combustible más viscoso, y para solucionar esto la dependencia de la presión de combustible llega a un límite tanto de la ciencia como de la técnica.

El spray del combustible inyectado en un motor de combustión interna se divide en dos zonas, la ruptura del spray primario cerca de la salida de la boquilla, donde hay una alta densidad de combustible inyectado, y la ruptura del spray secundario, donde el combustible se atomiza en gotas más pequeñas y se mezcla con aire, dando lugar a un proceso de evaporación debido a las altas temperaturas del aire comprimido. Aproximadamente el 50% del proceso de inyección tiene lugar antes de que comience el proceso de combustión (fig. 1), y el resto del combustible inyectado inicia el proceso de combustión. El combustible inyectado se mezcla con el aire caliente comprimido en la cámara de

combustión con el objetivo de obtener una mezcla homogénea y altamente reactiva capaz de encenderse y quemarse completamente. El proceso de mezcla y evaporación determina la calidad y la capacidad de la mezcla de aire y combustible inflamable [3].

En la presente investigación se propone experimentar el efecto que tiene la colisión del spray de combustible, en un concepto de dos y cuatro inyectores opuestos entre sí. En la actualidad se conoce muy poco sobre la experimentación de motores con inyectores múltiples, aunque de modo similar en 1992 Alfa Romeo introdujo la tecnología de la doble bujía, conocida también como “twin spark” [4]. En 1995, se llevó a cabo la experimentación de un concepto de motor con múltiples inyectores diésel, el prototipo constaba de 3 inyectores, uno montado verticalmente y dos en forma diagonal; los resultados de la emisión de gases mostraron una mejora en el nivel de partículas y de consumo de combustible. Este efecto se atribuye no a la colisión en sí de los sprays sino a la turbulencia generada en función de la posición de los inyectores [5]. Luego de aproximadamente 20 años se repitió este concepto anterior, pero con la particularidad de que se evitaba casi por completo la colisión del spray; el resultado fue una mejora en los niveles de NOx, explicando este efecto por un mejor manejo de la transferencia de calor en la cámara de combustión [6], esta conclusión se refuerza con un experimento de similares características y resultados llevados a cabo por Nyrenstedt et al. [7].

Los autores de las investigaciones anteriores [4-6], asumen que la colisión de los sprays de combustible contribuye a una coalición de las partículas atomizadas de combustible; sin embargo, esto no contempla los sistemas de inyección de combustible de alta presión (> 2000 bar) y la energía de cinética que llevan consigo.

El concepto presentado por M. Gutiérrez [8], se basa en la colisión directa de 2 y 4 flujos de atomización, cuya energía cinética produce

que las partículas atomizadas de combustible se reduzcan aún más debido a la interacción de los flujos. La simulación CFD de la colisión de 2 sprays muestra que el diámetro de las partículas atomizadas se reduce en 5%, lo que nos lleva a hipotetizar que una prueba experimental con 4 inyectores puede atomizar aún más las partículas de combustible, distribuyéndose de un modo más uniforme en todo el volumen de la cámara de combustión del motor.

El propósito de la presente investigación consiste en demostrar de modo experimental que los flujos de atomización de combustible al colisionar entre sí atomizan mejor todo el fluido inyectado y abarcan de modo más uniforme todo el volumen en el que se encuentran.

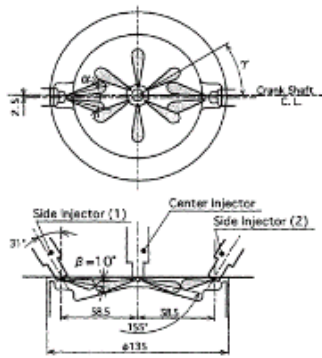


Figura 1. Concepto Multiinyector Takeda, Y., & Niihara, K. (1995) [4].

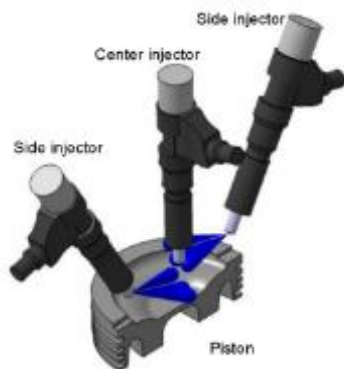


Figura 2. Concepto Multiinyector Okamoto, T., & Uchida, N. (2016) [5].



Figura 3. Concepto Multiinyector Nyrenstedt, G., Im, H., Andersson, A., & Johansson, B. (2019) [6].

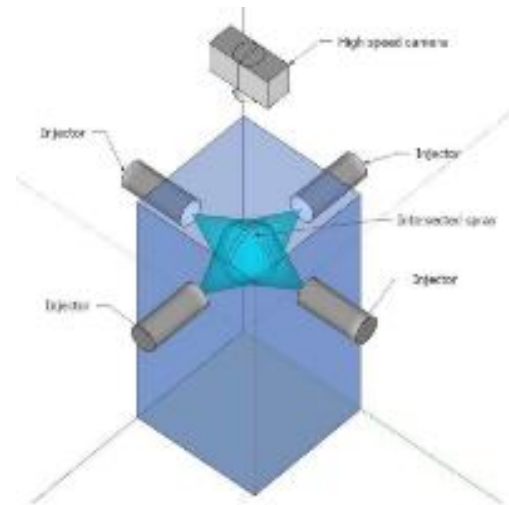


Figura 4. Concepto Multiinyector M. Gutiérrez. (2021) [7]. (2019) [7].

2. MATERIALES Y MÉTODOS

El banco de pruebas se conforma de un control de pulso de inyección capaz de proveer una duración de inyección de 250 ms; una cámara de video con capacidad de procesar 450 cuadros por segundo de un teléfono inteligente, 4 inyectores de gasolina, y como fluido de prueba se utiliza un limpiador de carburadores, cuya especificación se muestra en las siguientes figuras.



Figura 5. Controlador de pulsos de inyección.
Duración del pulso: 250ms. Voltaje: 12V DC.
Amperaje necesario con relé: 3.33 A.



Figura 8. Líquido limpiador de carburadores [8].
Densidad relativa: 0.847 @ 20°C. Viscosidad:
<50 cP @ 20°C. Temperatura de autoignición:
200-260 °C. Presión de salida: 10bar.



Figura 6. Cámara fotográfica y de video.
Resolución: Min 13 Megapixels, video 30-450 fps.

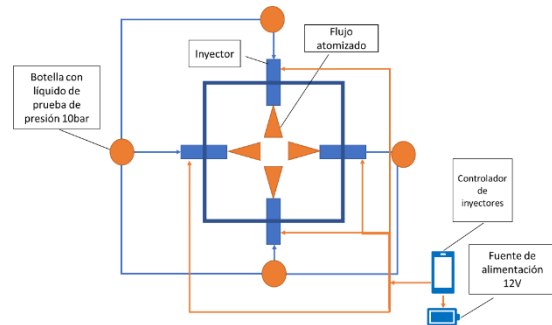


Figura 10. Esquema de la conexión del banco de pruebas.



Figura 7. Inyectores de gasolina. Tipo: Disco de 4 orificios. Ángulo de rociado: 15 deg. Resistencia de la bobina: 14.5 Ohmios. Flujo másico: 215cc/min @ 43PSI. Tiempo de activación @ 14VDC: 1.14ms. Tiempo de desactivación: 0.85ms @ 300KPa. Amperaje: 1.0 Amp. Presión: Min 30PSIG/ Max 100PSIG. Variación: 2 %. Diámetro: 16mm. O-Ring Diámetro: 14.5mm.

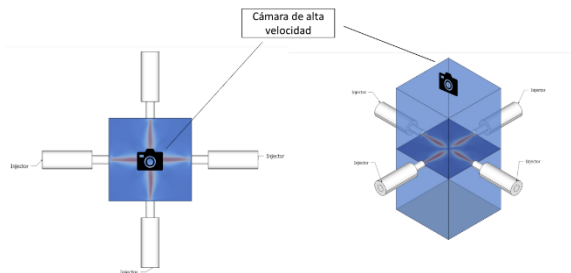


Figura 11. Disposición de los componentes para la experimentación.

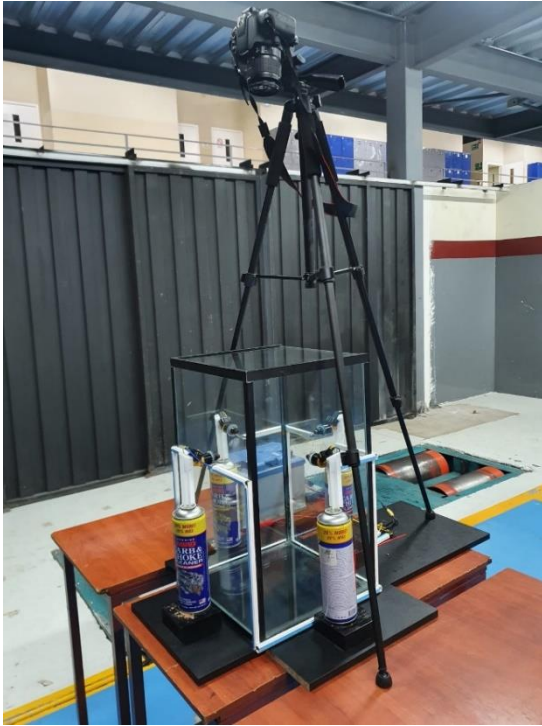


Figura 12. Banco de pruebas multi-inyector.

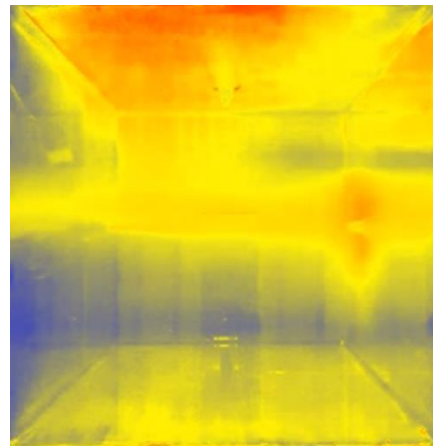
Los flujos de atomización con una duración de 250 ms. de 1, entre 2 y entre 4 inyectoros se registran en video en el plano superior del banco de pruebas. Luego las imágenes son procesadas buscando las diferencias entre los flujos para identificar las zonas mejor atomizadas. Se registraron también fotografías desde distintos ángulos, en donde se evidencia que la atomización ocupa de modo más homogéneo un mayor volumen de la cámara del banco de pruebas, en comparación con el flujo de atomización de un solo inyector. El análisis de las imágenes se lo realiza con la técnica de sustracción [9] y con filtros que permitan distinguir de modo más nítido la trayectoria, distribución e interacción del fluido. La prueba se lleva a cabo a presión atmosférica, por lo que la única sobrepresión es la de la inyección a 10 bares.

3. RESULTADOS

A continuación, se muestra la imagen 5ms antes de que termine la inyección total de 250 ms.



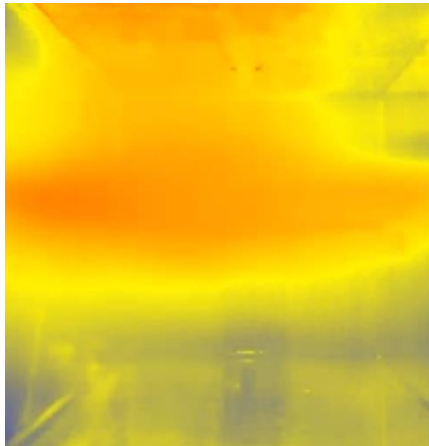
a. Spray con 1 inyector



b. Imagen analizada con 1 inyector



c. Spray con 2 inyectoros



d. Imagen analizada con 2 inyectores



e. Spray con 4 inyectores

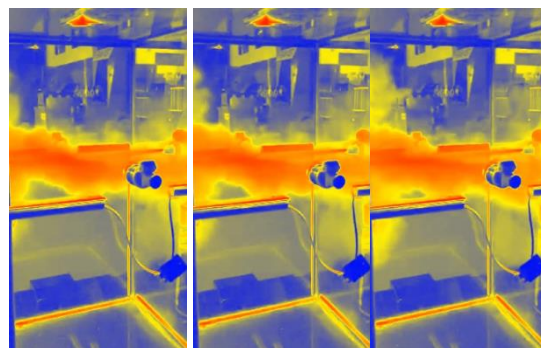
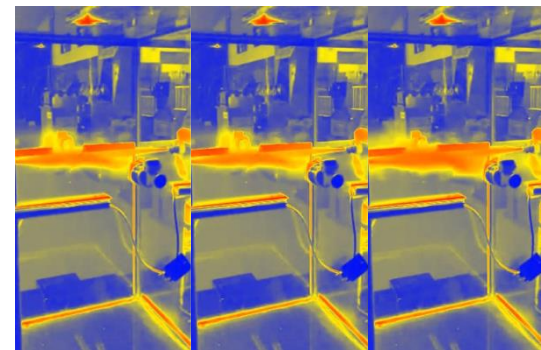
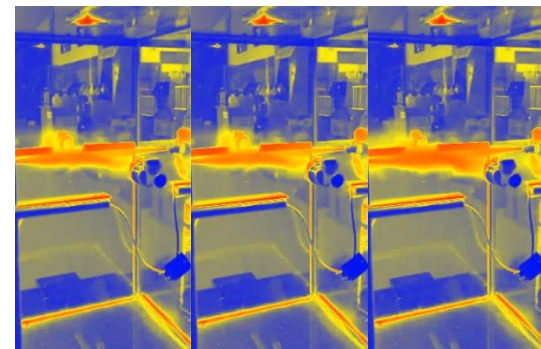
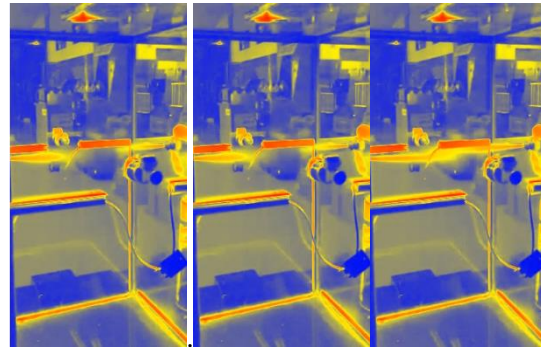


f.

Figura 13. Imagen analizada con 4 inyectores
 Figura 12. Resultados de la inyección del líquido de prueba con 1, 2 y 4 inyectores a 10 bares de presión y 250 ms de tiempo de inyección.

Las siguientes imágenes corresponden a la colisión de 2 sprays con la finalidad de observar la distribución volumétrica del spray, comprobar que en el centro del volumen no se

acumula fluido y observar las zonas en que se forman los vórtices.



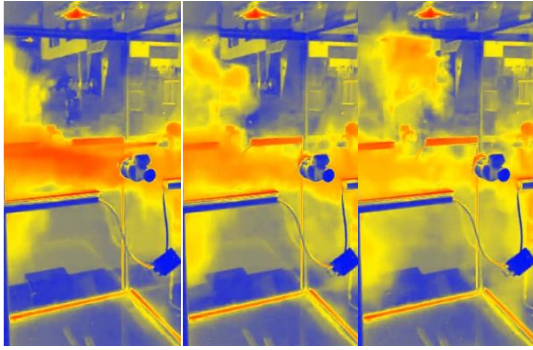


Figura 14. Imagen de la inyección del líquido de prueba con 2 inyectores a 10 bares de presión y 250 ms de tiempo de inyección en intervalos de 15 ms.

Las siguientes imágenes corresponden a la atomización del fluido luego de 5 ms terminada la inyección a 10 bares de presión. Se observan las zonas de alta, media y baja densidad con 1, 2 y 4 inyectores respectivamente.



a. Zonas de alta densidad del fluido



b. Zonas de media densidad del fluido



c. Zonas de baja densidad del fluido

Figura 15. Imágenes 5ms después de la inyección del líquido de prueba con 1, 2 y 4 inyectores a 10 bares de presión y 250 ms de tiempo de inyección.

5. ANÁLISIS DE RESULTADOS

En la figura 13, se observa que al final del proceso de inyección la zona con mayor densidad se ubica al final del spray, en el caso de tener un solo inyector; para el caso de dos inyectores, la zona de mayor concentración de combustible es longitudinal; para el caso de cuatro inyectores, la distribución ocupa toda la superficie que se observa y esto implica que ocupa de modo más uniforme todo el volumen en donde se prueba los sprays. Este efecto es considerablemente positivo en los motores de combustión interna; en donde la distribución uniforme del combustible en todo el volumen de la cámara de combustión, mejora sustancialmente la homogenización de la mezcla, así como una distribución de la fuerza de la combustión en un área mayor del pistón. La figura 14 muestra de mejor manera la distribución volumétrica del spray con 2 inyectores en donde al final del proceso de inyección, se observan vórtices en los extremos de la cámara de vidrio. De modo contrario a lo que sugieren los investigadores de las fuentes citadas en la introducción, la colisión directa de los sprays no provoca una coalescencia de las partículas atomizadas de combustible, sino que como se demuestra en esta investigación, se observa una mayor atomización y una mejor distribución del combustible atomizado en todo el volumen en el que este se encuentra. La figura 15 muestra en los círculos rojos que a medida que aumenta la colisión de los sprays en función del número de inyectores, disminuye la densidad de zonas ricas en combustible, con lo que se comprueba la hipótesis de que mejora la atomización y hay una mejor distribución del combustible en la cámara.

Una limitación importante que es necesario mencionar, es que el caudal de combustible con 2 y cuatro inyectores, aumenta en comparación con un solo inyector; esta es una condición que ineludiblemente debe mejorarse para evaluar con mucha más exactitud el efecto de la atomización con múltiples

inyectores; sin embargo, aun cuando la cantidad de fluido de prueba que entra a la cámara es mayor, el efecto de la atomización y la distribución del fluido es mejor como se observa en las figuras 13-15.

5. CONCLUSIONES

Como se mencionó en la introducción, el objetivo de la presente investigación consistió en demostrar que la colisión de sprays mejora la atomización de combustible, que es lo que en las figuras 5-6 se visualiza y se demuestra. Esta investigación muestra también que la atomización del combustible no solo depende de la turbulencia ni de la presión de la inyección, sino que la interacción de los sprays es bastante efectiva además de los beneficios de distribuir el fluido inyectado de modo más uniforme en todo el volumen de la cámara. El resultado de esto, es la posibilidad de una reingeniería de los motores de combustión interna, en donde se retome enfoques como el de la doble bujía, pero en este caso el doble inyector; es obvio que esto implica un rediseño de la cabeza de cilindros o incluso del mismo mecanismo biela manivela; sin embargo, no podemos negar la posibilidad ni la bondad del sistema que mostramos.

El mayor potencial de este concepto se puede aprovechar en los motores diésel o en motores gasolina con inyección directa, el mismo concepto puede aplicarse en motores a gas, pero en este caso, para elevar el nivel de homogenización de la mezcla es concebible pensar en la múltiple inyección de aire.

Nuestro estudio además de demostrar las ventajas de la colisión de los sprays, es un estímulo para buscar y probar ideas y conceptos que necesitan mejorar un tema pendiente desde la misma invención del motor de combustión interna, esto es la mezcla homogénea.

6. REFERENCIAS

- [1] Statistical Review of World Energy 2020. BP. Retrieved November 9, 2021, from <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2020-full-report.pdf>
- [2] Renewables 2020 Global Status Report Master slide deck. REN21 Secretariat. Retrieved November 30, 2021 <https://www.ren21.net/reports/global-status-report/>
- [3] Merker Günter P., & Teichmann Rüdiger. (2019). Grundlagen Verbrennungsmotoren Funktionsweise und alternative Antriebssysteme Verbrennung, messtechnik und simulation. Springer Vieweg.
- [4] Alfa Romeo Cars. Retrieved November 30, 2021, from <https://www.ukcar.com/history/Alfa%20Romeo/index.html>.
- [5] Takeda, Y., & Niimura, K. (1995). Characteristics of diesel combustion and emissions with a multi-injector system. SAE Technical Paper Series. <https://doi.org/10.4271/952511>
- [6] Okamoto, T., & Uchida, N. (2016). New concept for overcoming the trade-off between thermal efficiency, each loss and exhaust emissions in a heavy duty diesel engine. SAE International Journal of Engines, 9(2), 859–867. <https://doi.org/10.4271/2016-01-0729>
- [7] Nyrenstedt, G., Im, H., Andersson, A., & Johansson, B. (2019). Novel geometry reaching high efficiency for multiple injector concepts. SAE Technical Paper Series. <https://doi.org/10.4271/2019-01-0246>
- [8] Tablet School. Tablet School Journal. Nr.: 008. Vol.: 001. ISSN: 2661-6505. Art.: 2020-33-3313-0001. Feb 2021. M. Gutiérrez. “Babel Project – A Multiinjector Concept”. Retrieved November 10, 2021, from

<https://www.tablet-school.com/tablet-school-journal/>

[9] Safety Data Sheet Carb & Choke Cleaner - Tetconnect. (n.d.). Retrieved December 13, 2021, from https://www.tetconnect.com/images/stories/virtuemart/documents/CCN500_SDS.pdf

[10] Tablet School. Tablet School Journal. Nr.: 011. Vol.: 001. ISSN: 2661-6505. Art.: 2020-33-3317-0003. Feb 2022. S. Collaguazo. E. Zuñiga, M. Gutiérrez. “Método para evaluar flujos de atomización de combustible”. Paper accepted for publication. <https://www.tablet-school.com/tablet-school-journal/>

ANEXOS

ANEXOS INTRODUCCIÓN

Anexo 1 Statistical Review of World Energy 2020. BP. Retrieved November 9, 2021, from <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2020-full-report.pdf>

.....18-85

Anexo 2 [2] Renewables 2020 Global Status Report Master slide deck. REN21 Secretariat. Retrieved November 30, 2021 <https://www.ren21.net/reports/global-status-report/>

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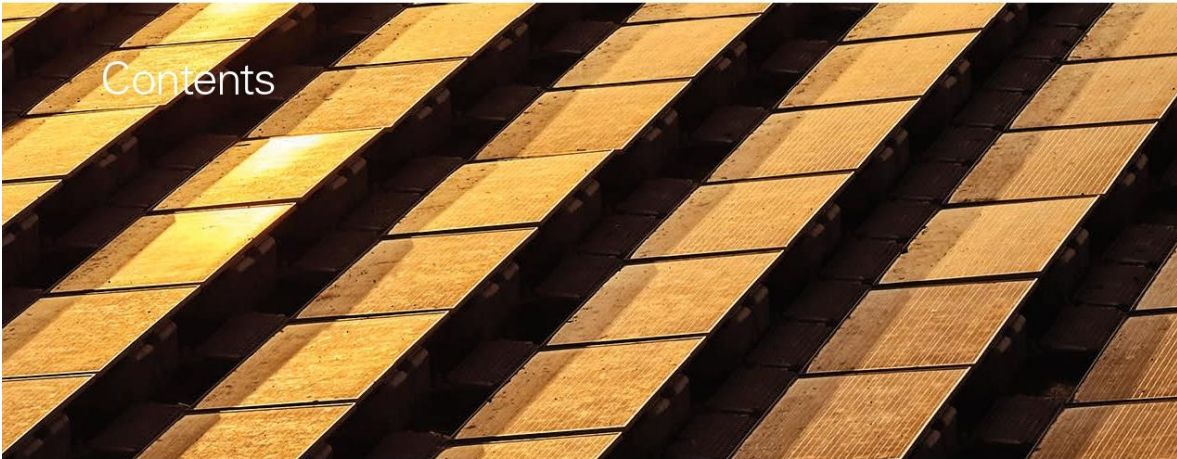
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Methodology

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

Chief executive officer's introduction



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

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

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

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

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

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

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

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

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

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

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

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

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

A handwritten signature in black ink, appearing to read 'Bernard Looney', written over a thin horizontal line.

Bernard Looney
Chief executive officer
June 2020

2019 at a glance

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

Energy developments

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

Carbon emissions

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

Oil

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

+1.3%

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



Natural gas

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

Coal

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

Renewables, hydro and nuclear

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

Electricity

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

Key minerals

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

The year in review

Introduction

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

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

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

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

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



Primary energy and carbon emissions

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

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

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

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

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

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

*Renewable power (excluding hydro) plus biofuels

41%

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

Oil

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

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

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

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

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

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



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

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

Refining and trade

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

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

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

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

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

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

2 million b/d

Decline in OPEC oil production, the largest decline since 2009



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

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

Natural gas

Consumption and production

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

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

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

Trade

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

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

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

Prices

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

Coal

Consumption and production

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

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

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

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

54 bcm

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



Coal trade

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

Renewables, hydroelectricity and nuclear

Renewables

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

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

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

Hydroelectricity and nuclear

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

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

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

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

10.4%

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



Electricity

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

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

Key minerals

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

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

In detail

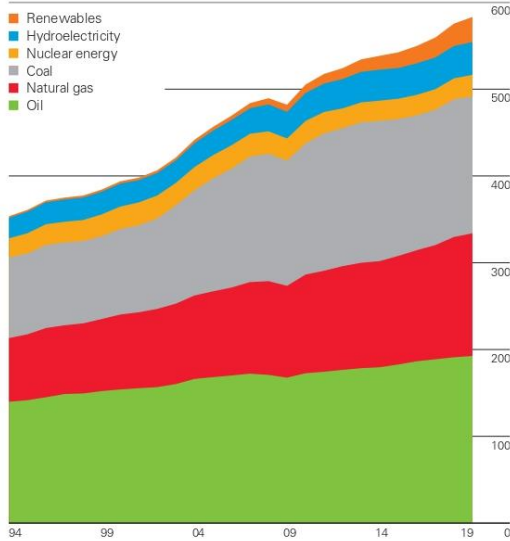
As well as the change to reported energy units (from million tonnes of oil equivalent to exajoules) there have been the following changes in the tables: biofuels consumption has been broken out of oil consumption and is now included in renewables consumption (as well as reported separately in its own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

Acknowledgements

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World consumption

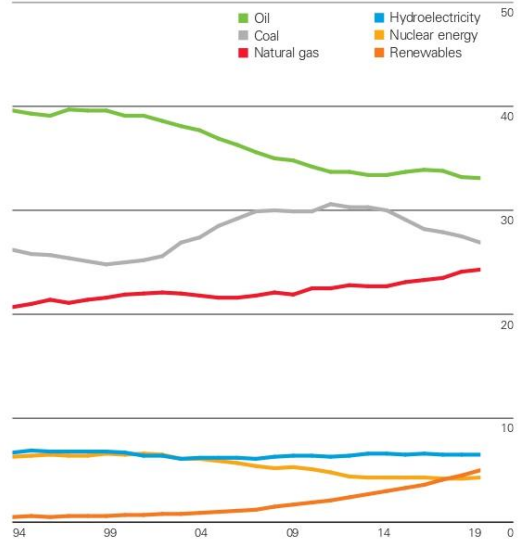
Exajoules



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

Shares of global primary energy

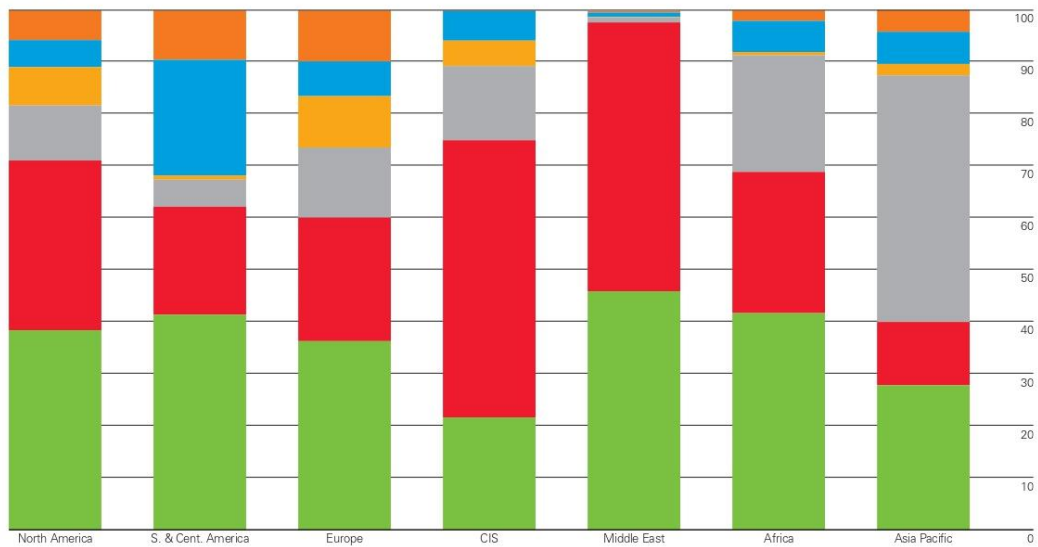
Percentage



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

Regional consumption pattern 2019

Percentage

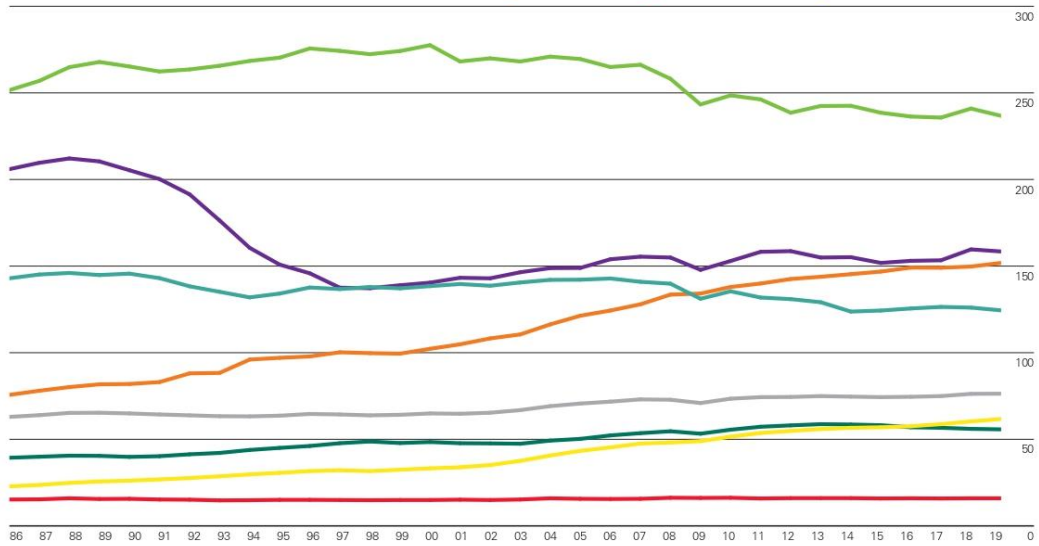


Oil remains the dominant fuel in Africa, Europe and the Americas, while natural gas dominates in CIS and the Middle East, accounting for more than half of the energy mix in both regions. Coal is the dominant fuel in the Asia Pacific region. In 2019 coal's share of primary energy fell to its lowest level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

Energy per capita by region

Gigajoules per head

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

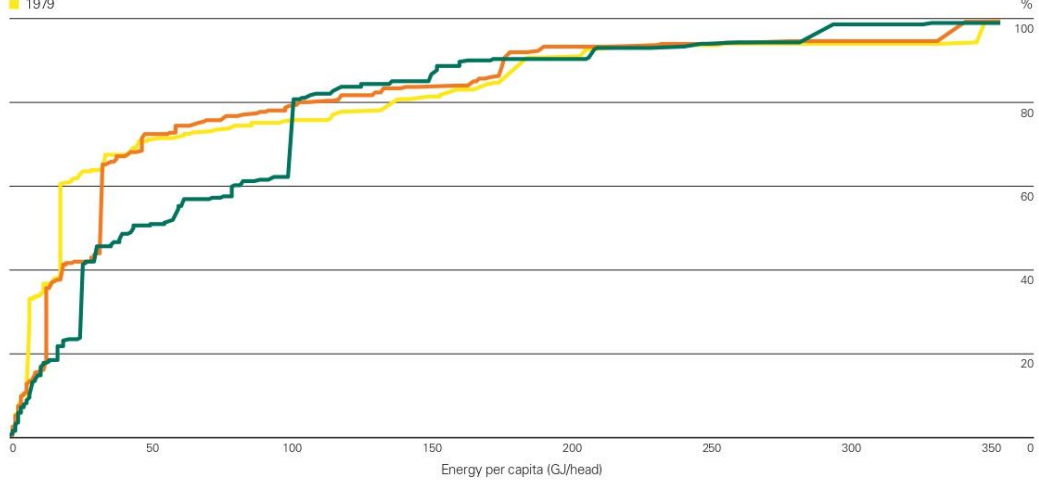


Average global energy consumption per capita increased by only 0.2% in 2019 to 75.7 GJ/head, driven by growth in the Middle East (1.4%) and Asia Pacific (2.4%). Energy demand per head fell in all other regions. North America is the region with the highest consumption per capita (236 GJ/head), followed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

Energy per capita: Distribution across countries

■ 2019
■ 1999
■ 1979

Cumulative share of world population



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



Total proved reserves

	At end 1999	At end 2009	At end 2018	At end 2019			
	Thousand million barrels	Thousand million barrels	Thousand million barrels	Thousand million barrels	Thousand million tonnes	Share of total	R/P ratio
Canada	181.6	175.0	170.8	169.7	27.3	9.8%	82.3
Mexico	21.5	11.9	5.8	5.8	0.8	0.3%	8.3
US	29.7	30.9	68.9	68.9	8.2	4.0%	11.1
Total North America	232.8	217.8	245.5	244.4	36.3	14.1%	27.2
Argentina	3.1	2.5	2.4	2.4	0.3	0.1%	10.5
Brazil	8.2	12.9	13.4	12.7	1.8	0.7%	12.1
Colombia	2.3	1.4	1.8	2.0	0.3	0.1%	6.1
Ecuador	2.6	2.7	1.6	1.6	0.2	0.1%	8.4
Peru	0.9	1.1	0.9	0.9	0.1	•	16.5
Trinidad & Tobago	0.8	0.8	0.2	0.2	†	•	8.1
Venezuela	76.8	211.2	303.8	303.8	48.0	17.5%	•
Other S. & Cent. America	1.3	0.8	0.5	0.5	0.1	•	12.7
Total S. & Cent. America	95.9	233.3	324.7	324.1	50.9	18.7%	143.8
Denmark	0.9	0.9	0.4	0.4	0.1	•	11.7
Italy	0.6	0.5	0.6	0.6	0.1	•	17.0
Norway	10.9	7.1	8.6	8.5	1.1	0.5%	13.5
Romania	1.2	0.6	0.6	0.6	0.1	•	22.0
United Kingdom	5.0	2.8	2.7	2.7	0.4	0.2%	6.6
Other Europe	2.0	2.0	1.6	1.6	0.2	0.1%	15.0
Total Europe	20.7	14.0	14.6	14.4	1.9	0.8%	11.6
Azerbaijan	1.2	7.0	7.0	7.0	1.0	0.4%	24.6
Kazakhstan	5.4	30.0	30.0	30.0	3.9	1.7%	42.6
Russian Federation	112.1	105.6	107.2	107.2	14.7	6.2%	25.5
Turkmenistan	0.5	0.6	0.6	0.6	0.1	•	6.2
Uzbekistan	0.6	0.6	0.6	0.6	0.1	•	26.3
Other CIS	0.3	0.3	0.3	0.3	†	•	17.6
Total CIS	120.1	144.0	145.7	145.7	19.8	8.4%	27.3
Iran	93.1	137.0	155.6	155.6	21.4	9.0%	120.6
Iraq	112.5	115.0	145.0	145.0	19.6	8.4%	83.1
Kuwait	96.5	101.5	101.5	101.5	14.0	5.9%	52.8
Oman	5.7	5.5	5.4	5.4	0.7	0.3%	15.2
Qatar	13.1	25.9	25.2	25.2	2.6	1.5%	36.7
Saudi Arabia	262.8	264.6	297.7	297.6	40.9	17.2%	68.9
Syria	2.3	2.5	2.5	2.5	0.3	0.1%	291.2
United Arab Emirates	97.8	97.8	97.8	97.8	13.0	5.6%	67.0
Yemen	1.9	3.0	3.0	3.0	0.4	0.2%	84.2
Other Middle East	0.2	0.3	0.2	0.2	†	•	2.6
Total Middle East	685.8	753.1	833.9	833.8	112.9	48.1%	75.3
Algeria	11.3	12.2	12.2	12.2	1.5	0.7%	22.5
Angola	5.1	9.5	8.2	8.2	1.1	0.5%	15.8
Chad	–	1.5	1.5	1.5	0.2	0.1%	32.4
Republic of Congo	1.7	2.0	3.0	3.0	0.4	0.2%	24.1
Egypt	3.8	4.4	3.1	3.1	0.4	0.2%	12.3
Equatorial Guinea	0.6	1.7	1.1	1.1	0.1	0.1%	16.7
Gabon	2.6	2.0	2.0	2.0	0.3	0.1%	25.1
Libya	29.5	46.4	48.4	48.4	6.3	2.8%	107.9
Nigeria	29.0	37.2	37.0	37.0	5.0	2.1%	48.0
South Sudan	n/a	n/a	3.5	3.5	0.5	0.2%	69.1
Sudan	0.3	5.0	1.5	1.5	0.2	0.1%	40.2
Tunisia	0.3	0.4	0.4	0.4	0.1	•	23.2
Other Africa	0.7	0.6	3.9	3.9	0.5	0.2%	33.8
Total Africa	84.7	123.0	125.7	125.7	16.6	7.2%	41.0
Australia	4.7	4.1	2.4	2.4	0.3	0.1%	13.4
Brunei	1.3	1.1	1.1	1.1	0.1	0.1%	24.8
China	15.1	21.6	26.2	26.2	3.6	1.5%	18.7
India	5.0	5.8	4.5	4.7	0.6	0.3%	15.5
Indonesia	5.2	4.3	3.2	3.5	0.3	0.1%	8.7
Malaysia	2.1	3.6	2.8	2.8	0.4	0.2%	11.9
Thailand	0.4	0.4	0.3	0.3	†	•	1.7
Vietnam	1.8	4.5	4.4	4.4	0.6	0.3%	51.0
Other Asia Pacific	1.4	1.1	1.2	1.4	0.2	0.1%	16.3
Total Asia Pacific	37.0	46.6	46.0	45.7	6.1	2.6%	16.4
Total World	1277.1	1531.8	1735.9	1733.9	244.6	100.0%	49.9
of which: OECD	256.4	234.7	261.3	260.1	38.3	15.0%	25.1
Non-OECD	1020.7	1297.1	1474.6	1473.7	206.3	85.0%	60.4
OPEC	821.8	1040.8	1214.8	1214.7	171.8	70.1%	93.6
Non-OPEC	455.3	491.0	521.1	519.2	72.8	29.9%	23.9
European Union	8.8	6.0	5.1	5.0	0.7	0.3%	9.0
Canadian oil sands: Total	175.2	169.8	163.5	162.4	26.4	9.4%	•
of which: Under active development	11.9	26.5	21.2	20.1	3.3	1.2%	•
Venezuela: Orinoco Belt	–	133.4	261.8	261.8	42.0	15.1%	•

†Less than 0.05.

•Less than 0.05%.

n/a not available.

*More than 500 years.

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

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

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

Canadian oil sands 'under active development' are an official estimate. Venezuela Orinoco Belt reserves are based on the OPEC Secretariat and government announcements. Reserves and R/P ratio for Canada includes Canadian oil sands. Reserves and R/P ratio for Venezuela includes the Orinoco Belt. Saudi Arabia's oil reserves include NGLs from 2017.

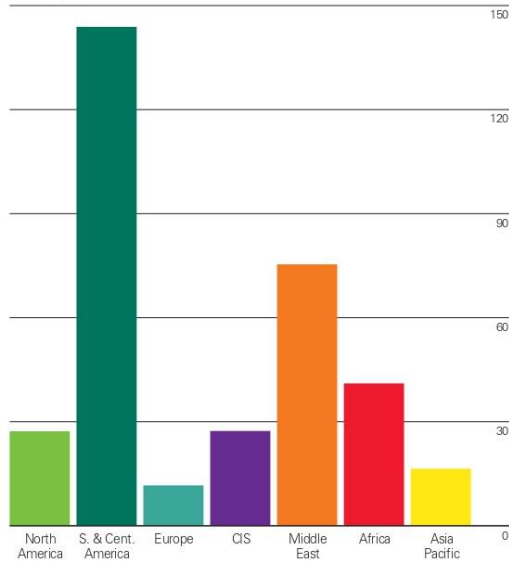
Reserves include gas condensate and natural gas liquids (NGLs) as well as crude oil.

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

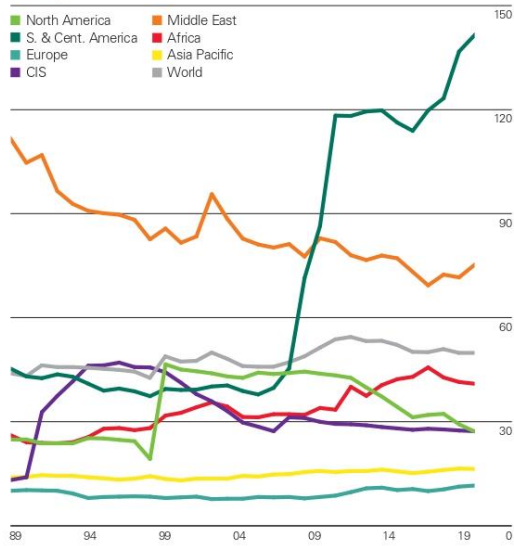
Reserves-to-production (R/P) ratios

Years

2019 by region



History

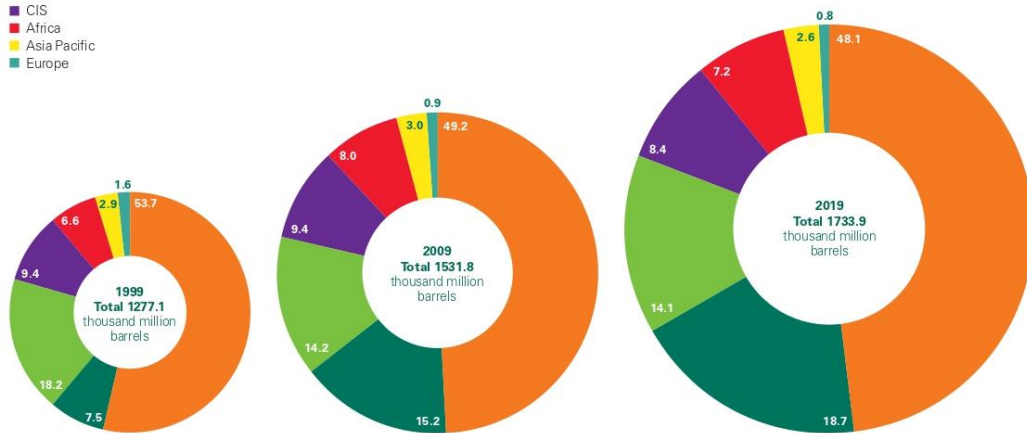


Global proved oil reserves were 1734 billion barrels at the end of 2019, down 2 billion barrels versus 2018. The global R/P ratio shows that oil reserves in 2019 accounted for 50 years of current production. Regionally, South & Central America has the highest R/P ratio (144 years) while Europe has the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

Distribution of proved reserves in 1999, 2009 and 2019

Percentage

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



Oil: Crude oil and condensate production in thousands of barrels per day*

Thousand barrels daily	2009										Growth rate per annum			Share 2019
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019	2008-18	
Canada	2705	2849	3021	3250	3486	3758	3863	3868	4216	4596	4688	2.0%	5.4%	5.6%
Mexico	2601	2577	2553	2548	2522	2429	2267	2154	1948	1833	1701	-7.2%	-4.1%	2.0%
US	5357	5484	5667	6518	7493	8787	9439	8839	9352	10990	12232	11.3%	8.2%	14.7%
Total North America	10663	10910	11241	12317	13501	14973	15569	14861	15516	17420	18620	6.9%	5.2%	22.4%
Argentina	604	589	553	549	540	532	532	511	480	489	509	-3.9%	-3.2%	0.6%
Brazil	1950	2055	2105	2061	2024	2255	2437	2510	2622	2587	2788	7.8%	3.6%	3.4%
Colombia	671	786	915	944	1010	990	1006	886	854	865	886	2.4%	3.9%	1.1%
Ecuador	486	486	500	504	526	557	543	548	531	517	531	2.7%	0.2%	0.6%
Peru	117	123	117	112	118	121	104	91	88	98	95	-2.8%	*	0.1%
Trinidad & Tobago	107	98	92	82	81	81	79	71	72	63	59	-7.3%	-5.7%	0.1%
Venezuela	2879	2895	2623	2580	2564	2578	2514	2242	1992	1386	839	-39.5%	-7.6%	1.0%
Other S. & Cent. America	121	125	126	131	135	140	133	122	118	113	105	-6.9%	-1.3%	0.1%
Total S. & Cent. America	6935	6957	7031	6963	6998	7256	7347	6982	6757	6119	5811	-5.0%	-1.3%	7.0%
Denmark	265	249	225	204	178	167	158	142	138	116	103	-11.2%	-8.7%	0.1%
Italy	95	106	110	112	114	120	113	78	86	97	89	-8.7%	-1.1%	0.1%
Norway	2058	1871	1758	1612	1532	1562	1608	1647	1620	1516	1437	-5.2%	-3.5%	1.7%
Romania	90	86	84	79	83	82	80	76	73	72	71	-1.3%	-2.6%	0.1%
United Kingdom	1332	1234	1028	885	810	791	903	933	913	1002	1019	1.6%	-3.2%	1.2%
Other Europe	331	319	316	317	327	324	317	297	284	289	282	-2.5%	-1.9%	0.3%
Total Europe	4171	3865	3521	3209	3046	3045	3180	3173	3114	3092	3000	-3.0%	-3.5%	3.6%
Azerbaijan	1014	1023	919	872	877	849	840	826	781	783	762	-2.8%	-1.3%	0.9%
Kazakhstan	1609	1676	1684	1662	1720	1701	1672	1637	1813	1900	1903	0.1%	2.5%	2.3%
Russian Federation	9927	10150	10287	10395	10528	10595	10758	11003	11017	11201	11292	0.8%	1.4%	13.6%
Turkmenistan	211	216	224	231	239	246	254	250	248	236	228	-3.5%	1.4%	0.3%
Uzbekistan	95	78	77	68	63	61	59	58	61	64	62	-3.2%	-4.5%	0.1%
Other CIS	36	36	36	35	35	35	36	36	37	38	39	2.9%	0.3%	*
Total CIS	12893	13179	13226	13263	13463	13488	13619	13811	13957	14222	14284	0.4%	1.3%	17.2%
Iran	4015	4068	4048	3398	3192	3273	3392	4090	4470	4260	2980	-30.0%	0.2%	3.6%
Iraq	2405	2424	2728	3037	3058	3198	3945	4375	4473	4568	4712	3.2%	6.7%	5.7%
Kuwait	2278	2307	2645	2890	2847	2830	2782	2860	2704	2737	2678	-2.1%	0.6%	3.2%
Oman	813	865	885	918	942	943	981	1004	971	978	971	-0.8%	2.6%	1.2%
Qatar	1151	1307	1399	1491	1520	1508	1463	1465	1432	1427	1405	-1.6%	1.7%	1.7%
Saudi Arabia	8411	8423	9566	9987	9875	9941	10420	10688	10175	10533	10145	-3.7%	1.1%	12.2%
Syria	366	350	319	146	45	23	19	17	17	16	16	-3.2%	-27.0%	*
United Arab Emirates	2495	2603	2853	2946	3084	3063	3284	3384	3279	3308	3360	1.6%	1.6%	4.0%
Yemen	286	284	197	154	173	128	38	16	44	55	70	27.2%	-15.4%	0.1%
Other Middle East	182	182	191	173	199	204	203	204	199	196	196	*	0.7%	0.2%
Total Middle East	22402	22813	24831	25140	24933	25113	26527	28104	27763	28078	26532	-5.5%	1.5%	31.9%
Algeria	1517	1461	1416	1320	1275	1329	1290	1316	1287	1259	1239	-1.6%	-2.6%	1.5%
Angola	1734	1793	1656	1714	1716	1672	1780	1722	1632	1479	1377	-6.9%	-2.2%	1.7%
Chad	118	122	114	101	91	89	111	117	98	116	127	9.8%	-0.9%	0.2%
Republic of Congo	269	307	292	268	234	245	227	225	263	323	332	2.6%	3.3%	0.4%
Egypt	665	663	649	649	643	667	662	631	603	644	633	-1.7%	-0.1%	0.8%
Equatorial Guinea	310	286	280	299	261	266	242	204	174	169	159	-6.0%	-7.0%	0.2%
Gabon	241	233	236	221	213	211	214	221	210	193	218	12.7%	-2.1%	0.3%
Libya	1687	1748	508	1499	1025	510	422	397	909	1144	1200	4.9%	-4.5%	1.4%
Nigeria	2138	2455	2373	2330	2193	2188	2119	1822	1890	1922	2021	5.2%	-0.9%	2.4%
South Sudan	n/a	n/a	n/a	31	100	155	148	117	122	128	139	8.7%	n/a	0.2%
Sudan	475	462	291	103	118	120	109	104	95	100	102	2.2%	-14.1%	0.1%
Tunisia	82	79	70	70	64	59	54	51	43	42	42	-	-7.1%	0.1%
Other Africa	181	149	198	196	225	234	273	255	300	299	316	5.7%	5.0%	0.4%
Total Africa	9418	9759	8083	8802	8158	7745	7649	7180	7626	7818	7905	1.1%	-2.2%	9.5%
Australia	423	471	411	405	335	353	322	292	284	295	400	35.8%	-4.3%	0.5%
Brunei	155	159	153	146	122	114	115	109	101	100	110	10.1%	-4.7%	0.1%
China	3805	4077	4074	4155	4216	4246	4309	3999	3846	3798	3836	1.0%	*	4.6%
India	690	762	793	786	789	778	771	744	744	719	677	-5.9%	0.2%	0.8%
Indonesia	949	945	902	859	825	789	786	831	801	772	745	-3.5%	-2.3%	0.9%
Malaysia	659	653	583	598	588	610	662	667	660	653	604	-7.4%	-0.5%	0.7%
Thailand	238	242	224	239	241	233	248	258	240	228	228	*	*	0.3%
Vietnam	332	304	308	339	337	315	342	308	275	243	225	-7.7%	-2.1%	0.3%
Other Asia Pacific	281	270	256	246	237	261	265	250	241	208	204	-1.7%	-3.3%	0.2%
Total Asia Pacific	7531	7883	7705	7773	7690	7699	7820	7457	7192	7015	7029	0.2%	-0.8%	8.5%
Total World	74013	75366	75638	77467	77789	79318	81711	81567	81926	83764	83182	-0.7%	1.0%	100.0%
of which: OECD	15119	15114	15035	15789	16730	18234	18937	18201	18793	20677	21891	5.9%	3.1%	26.3%
Non-OECD	58894	60253	60602	61678	61059	61084	62773	63366	63133	63087	61291	-2.8%	0.4%	73.7%
OPEC	30866	31290	31725	32993	32063	31861	33174	34093	33990	33798	31790	-5.9%	0.2%	38.2%
Non-OPEC	43147	44076	43912	44474	45726	47457	48537	47474	47936	49966	51392	2.9%	1.6%	61.8%
European Union	1960	1839	1609	1441	1356	1331	1426	1390	1364	1438	1421	-1.2%	-3.6%	1.7%

Source: includes data from FGE.

*Includes crude oil, shale/tight oil, oil sands, lease condensate or gas condensates that require further refining. Excludes liquid fuels from other sources such as biomass and synthetic derivatives of coal and natural gas.

*Less than 0.05%.

n/a not available.

Note: Annual changes and shares of total are calculated using thousand barrels daily figures.

Oil: Natural gas liquids production in thousands of barrels per day*

Thousand barrels daily											Growth rate per annum		Share 2019	
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2008-18		
Canada	626	608	615	610	642	661	709	787	821	904	963	6.5%	3.7%	8.0%
Mexico	377	382	388	363	353	355	320	302	276	235	217	-7.5%	-4.5%	1.8%
US	1910	2074	2216	2408	2606	3015	3342	3509	3783	4369	4813	10.2%	9.4%	40.1%
Total North America	2913	3064	3219	3381	3600	4031	4371	4599	4880	5509	5993	8.8%	7.1%	49.9%
Argentina	126	123	114	107	104	105	114	99	110	102	112	9.8%	-1.9%	0.9%
Brazil	69	70	68	70	72	87	88	81	99	92	89	-3.8%	2.2%	0.7%
Colombia	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ecuador	2	2	1	1	1	-	-	-	-	-	-	n/a	-100.0%	-
Peru	38	42	42	45	54	54	49	50	49	56	47	-15.1%	8.5%	0.4%
Trinidad & Tobago	44	47	44	35	34	33	30	25	27	24	23	-1.9%	-3.7%	0.2%
Venezuela	159	147	132	124	116	114	117	105	104	88	80	-10.0%	-6.0%	0.7%
Other S. & Cent. America	15	19	19	16	17	14	13	12	15	14	13	-8.7%	-0.3%	0.1%
Total S. & Cent. America	453	451	419	399	398	407	411	373	404	376	363	-3.3%	-1.5%	3.0%
Denmark	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Italy	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Norway	285	261	275	300	300	318	332	343	345	329	293	-10.9%	1.5%	2.4%
Romania	4	4	5	4	3	3	3	4	3	3	4	39.6%	-6.4%	-
United Kingdom	142	125	86	62	55	62	60	82	92	90	99	10.3%	-5.9%	0.8%
Other Europe	25	23	20	19	17	15	14	16	19	19	17	-11.7%	-3.6%	0.1%
Total Europe	456	413	385	384	374	399	410	445	459	441	413	-6.3%	-0.8%	3.4%
Azerbaijan	12	13	13	10	11	12	11	11	11	12	17	37.8%	-5.3%	0.1%
Kazakhstan	†	†	†	2	17	9	23	18	25	27	28	4.5%	31.4%	0.2%
Russian Federation	225	228	247	260	278	265	249	266	238	237	248	4.4%	2.8%	2.1%
Turkmenistan	10	10	10	14	17	17	20	20	23	25	36	44.8%	9.3%	0.3%
Uzbekistan	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Other CIS	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	-
Total CIS	248	252	271	286	323	303	299	315	297	302	330	9.1%	3.5%	2.7%
Iran	270	352	404	412	418	441	461	488	537	541	555	2.6%	8.4%	4.6%
Iraq	41	45	45	42	45	40	41	48	64	64	68	5.3%	6.6%	0.6%
Kuwait	224	257	273	283	287	276	288	290	305	313	318	1.5%	3.7%	2.6%
Oman	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Qatar	264	323	426	437	471	466	470	473	450	473	478	1.1%	7.9%	4.0%
Saudi Arabia	1298	1442	1513	1635	1518	1577	1578	1718	1717	1728	1687	-2.4%	3.6%	14.0%
Syria	35	35	34	25	14	10	8	8	8	8	8	-0.1%	-13.7%	0.1%
United Arab Emirates	300	334	447	479	482	539	614	654	631	604	638	5.6%	7.5%	5.3%
Yemen	22	23	23	24	24	25	26	26	27	28	28	-	2.7%	0.2%
Other Middle East	10	10	11	10	10	10	10	10	11	11	19	69.0%	1.2%	0.2%
Total Middle East	2464	2821	3175	3346	3269	3386	3494	3715	3749	3770	3797	0.7%	5.1%	31.6%
Algeria	258	228	225	216	210	260	268	261	254	252	247	-1.7%	-2.0%	2.1%
Angola	20	19	14	20	22	30	16	23	39	40	40	-	6.4%	0.3%
Chad	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Republic of Congo	7	7	9	12	9	8	7	7	7	7	7	-	13.3%	0.1%
Egypt	65	61	65	66	67	47	64	60	57	55	53	-3.9%	-1.6%	0.4%
Equatorial Guinea	22	20	21	20	21	19	17	19	21	21	21	-	0.3%	0.2%
Gabon	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Libya	51	50	8	40	22	8	15	15	20	21	27	27.7%	-10.9%	0.2%
Nigeria	73	78	88	82	86	88	82	78	80	85	88	4.0%	1.7%	0.7%
South Sudan	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sudan	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Tunisia	9	4	7	13	12	12	10	9	5	8	8	-	-	0.1%
Other Africa	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1	1	54.0%	n/a	-
Total Africa	506	468	437	468	449	471	480	473	483	490	493	0.6%	-1.4%	4.1%
Australia	84	77	71	73	72	83	62	69	64	61	90	47.7%	-2.9%	0.8%
Brunei	14	13	13	13	13	12	11	12	13	12	12	-2.2%	-1.7%	0.1%
China	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
India	148	140	144	140	136	128	122	130	141	150	150	-0.3%	2.8%	1.2%
Indonesia	45	58	50	58	58	58	52	45	37	36	36	-0.3%	2.3%	0.3%
Malaysia	29	79	76	65	39	39	35	59	58	54	46	-15.3%	3.3%	0.4%
Thailand	147	152	205	232	225	231	233	231	247	249	249	-0.2%	5.8%	2.1%
Vietnam	8	8	8	8	10	9	10	9	13	12	12	-11.6%	5.0%	0.1%
Other Asia Pacific	51	48	46	45	38	36	33	31	32	25	26	1.4%	-6.8%	0.2%
Total Asia Pacific	526	574	613	634	591	595	557	586	600	602	621	3.0%	2.3%	5.2%
Total World	7565	8043	8519	8899	9005	9592	10022	10505	10872	11490	12010	4.5%	4.7%	100.0%
of which: OECD	3451	3557	3677	3841	4050	4514	4844	5109	5400	6006	6490	8.1%	6.0%	54.0%
Non-OECD	4114	4486	4842	5058	4955	5077	5178	5396	5471	5484	5520	0.7%	3.5%	46.0%
OPEC	2724	2982	3180	3365	3237	3401	3503	3706	3779	3765	3776	0.3%	3.6%	31.4%
Non-OPEC	4841	5061	5339	5534	5768	6191	6519	6799	7093	7725	8235	6.6%	5.3%	68.6%
European Union	163	144	104	78	69	75	73	95	106	102	110	8.0%	-6.0%	0.9%

*Includes ethane, LPG and naphtha separated from the production of natural gas. Excludes condensates.
†Less than 0.05%.

*Less than 0.05%.

n/a not available.

Note: Annual changes and shares of total are calculated using thousand barrels daily figures.

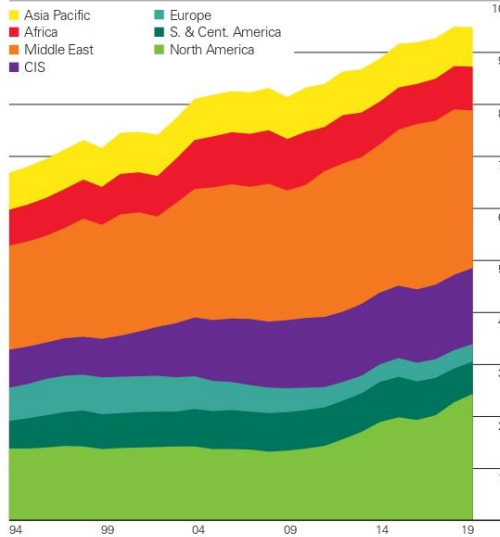
Source: includes data from FGE, ICIS.

Oil: Consumption in exajoules*

	2009-2019											Growth rate per annum			Share 2019
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019	2008-18	2019	
Canada	4.13	4.43	4.54	4.41	4.41	4.48	4.37	4.44	4.45	4.59	4.50	-2.0%	0.5%	2.3%	
Mexico	3.89	3.91	3.97	4.04	3.93	3.75	3.70	3.73	3.59	3.48	3.29	-5.5%	-1.4%	1.7%	
US	35.05	35.61	34.89	34.12	34.69	34.94	35.66	35.92	36.29	37.11	36.99	-0.3%	*	19.2%	
Total North America	43.07	43.95	43.41	42.57	43.03	43.17	43.74	44.09	44.32	45.18	44.78	-0.9%	*	23.2%	
Argentina	1.05	1.17	1.18	1.22	1.31	1.29	1.32	1.29	1.26	1.20	1.19	-1.5%	1.2%	0.6%	
Brazil	4.16	4.54	4.83	4.98	5.26	5.43	5.09	4.83	4.90	4.69	4.73	0.8%	1.1%	2.5%	
Chile	0.78	0.69	0.76	0.76	0.73	0.71	0.72	0.76	0.73	0.75	0.76	1.4%	-0.7%	0.4%	
Colombia	0.46	0.51	0.55	0.60	0.60	0.64	0.67	0.70	0.68	0.69	0.70	1.6%	-3.3%	0.4%	
Ecuador	0.39	0.45	0.46	0.47	0.50	0.53	0.51	0.48	0.47	0.51	0.49	-3.1%	3.0%	0.3%	
Peru	0.36	0.37	0.43	0.41	0.43	0.42	0.47	0.49	0.48	0.50	0.51	1.7%	3.6%	0.3%	
Trinidad & Tobago	0.09	0.10	0.09	0.09	0.10	0.09	0.09	0.10	0.09	0.09	0.08	-6.5%	-0.9%	*	
Venezuela	1.48	1.48	1.50	1.61	1.59	1.46	1.29	1.08	0.93	0.80	0.71	-11.9%	-5.8%	0.4%	
Other S. & Cent. America	2.44	2.45	2.47	2.47	2.42	2.41	2.55	2.63	2.64	2.68	2.69	0.2%	0.6%	1.4%	
Total S. & Cent. America	11.21	11.76	12.26	12.61	12.95	12.97	12.71	12.37	12.18	11.92	11.86	-0.5%	0.5%	6.1%	
Austria	0.53	0.55	0.51	0.51	0.53	0.51	0.50	0.52	0.53	0.54	0.55	2.1%	-0.3%	0.3%	
Belgium	1.38	1.43	1.33	1.29	1.32	1.30	1.35	1.37	1.39	1.42	1.38	-2.9%	-0.7%	0.7%	
Czech Republic	0.41	0.38	0.39	0.39	0.37	0.39	0.38	0.36	0.42	0.43	0.43	0.7%	0.1%	0.2%	
Finland	0.43	0.45	0.43	0.41	0.43	0.40	0.40	0.43	0.41	0.41	0.39	-4.8%	-1.1%	0.2%	
France	3.66	3.53	3.46	3.34	3.30	3.19	3.19	3.17	3.18	3.17	3.15	-0.6%	-1.8%	1.6%	
Germany	4.82	4.89	4.73	4.70	4.80	4.67	4.67	4.76	4.87	4.63	4.68	0.9%	-0.8%	2.4%	
Greece	0.88	0.79	0.75	0.66	0.62	0.62	0.64	0.64	0.66	0.65	0.68	4.2%	-3.5%	0.4%	
Hungary	0.30	0.28	0.30	0.28	0.27	0.30	0.32	0.32	0.34	0.37	0.37	0.9%	1.4%	0.2%	
Italy	3.18	3.08	2.97	2.78	2.54	2.40	2.50	2.52	2.54	2.60	2.49	-4.4%	-2.7%	1.3%	
Netherlands	1.91	1.94	1.97	1.87	1.77	1.69	1.65	1.71	1.64	1.68	1.65	-1.7%	-1.7%	0.9%	
Norway	0.43	0.45	0.43	0.43	0.44	0.41	0.42	0.40	0.40	0.41	0.39	-6.3%	-0.3%	0.2%	
Poland	1.10	1.16	1.16	1.11	1.04	1.04	1.09	1.20	1.30	1.33	1.34	1.0%	1.8%	0.7%	
Portugal	0.55	0.54	0.51	0.46	0.48	0.47	0.48	0.48	0.50	0.48	0.51	6.3%	-2.2%	0.3%	
Romania	0.39	0.37	0.38	0.38	0.35	0.38	0.38	0.40	0.42	0.43	0.45	5.5%	-0.2%	0.2%	
Spain	3.06	2.98	2.84	2.66	2.49	2.48	2.66	2.65	2.66	2.72	2.72	0.1%	-1.8%	1.4%	
Sweden	0.66	0.66	0.61	0.60	0.59	0.58	0.57	0.59	0.58	0.56	0.57	2.7%	-2.0%	0.3%	
Switzerland	0.53	0.50	0.48	0.48	0.51	0.47	0.47	0.44	0.45	0.43	0.44	2.2%	-1.9%	0.2%	
Turkey	1.41	1.37	1.34	1.41	1.51	1.55	1.85	1.98	2.07	2.00	2.03	1.8%	3.7%	1.1%	
Ukraine	0.59	0.55	0.57	0.55	0.52	0.44	0.39	0.41	0.42	0.41	0.44	6.0%	-3.9%	0.2%	
United Kingdom	3.26	3.22	3.17	3.08	3.03	3.03	3.11	3.20	3.22	3.17	3.11	-2.1%	-0.8%	1.6%	
Other Europe	2.57	2.53	2.47	2.37	2.32	2.31	2.40	2.50	2.59	2.61	2.63	0.7%	-0.5%	1.4%	
Total Europe	32.02	31.65	30.79	29.76	29.23	28.64	29.33	30.04	30.60	30.46	30.40	-0.2%	-1.0%	15.7%	
Azerbaijan	0.14	0.14	0.17	0.18	0.20	0.20	0.20	0.20	0.20	0.21	0.21	3.2%	3.0%	0.1%	
Belarus	0.39	0.31	0.36	0.44	0.30	0.34	0.29	0.29	0.29	0.31	0.32	2.7%	-0.8%	0.2%	
Kazakhstan	0.41	0.43	0.50	0.50	0.53	0.53	0.59	0.61	0.63	0.67	0.69	3.2%	3.1%	0.4%	
Russian Federation	5.55	5.77	6.16	6.26	6.26	6.59	6.25	6.42	6.33	6.50	6.57	1.1%	1.2%	3.4%	
Turkmenistan	0.22	0.24	0.25	0.26	0.27	0.28	0.28	0.28	0.28	0.29	0.31	6.8%	2.5%	0.2%	
Uzbekistan	0.18	0.16	0.15	0.13	0.12	0.12	0.11	0.10	0.10	0.09	0.09	-3.2%	-7.1%	*	
Other CIS	0.13	0.13	0.13	0.15	0.15	0.15	0.15	0.17	0.16	0.18	0.18	2.1%	3.7%	0.1%	
Total CIS	7.02	7.18	7.72	7.92	7.83	8.20	7.88	8.06	7.98	8.24	8.37	1.5%	1.2%	4.3%	
Iran	3.93	3.59	3.66	3.74	4.08	3.80	3.37	3.46	3.49	3.54	3.92	10.8%	-1.1%	2.0%	
Iraq	1.09	1.16	1.28	1.36	1.46	1.39	1.39	1.55	1.48	1.46	1.49	1.7%	4.3%	0.8%	
Israel	0.47	0.48	0.51	0.60	0.44	0.42	0.45	0.46	0.50	0.49	0.50	1.7%	-0.4%	0.3%	
Kuwait	0.87	0.91	0.84	0.94	0.98	0.84	0.88	0.91	0.81	0.80	0.78	-2.5%	-0.1%	0.4%	
Oman	0.24	0.28	0.29	0.32	0.36	0.37	0.38	0.39	0.50	0.58	0.61	3.9%	8.7%	0.3%	
Qatar	0.27	0.30	0.37	0.38	0.43	0.45	0.52	0.55	0.48	0.50	0.54	8.4%	5.8%	0.3%	
Saudi Arabia	5.45	5.92	6.05	6.36	6.37	6.99	7.26	7.18	7.07	6.86	6.92	0.9%	3.3%	3.6%	
United Arab Emirates	1.26	1.35	1.46	1.53	1.69	1.71	1.93	1.98	1.93	2.01	1.95	-2.8%	-4.5%	1.1%	
Other Middle East	1.60	1.49	1.47	1.39	1.28	1.27	1.10	1.05	1.07	1.06	1.08	2.6%	-4.4%	0.6%	
Total Middle East	15.20	15.46	15.92	16.61	17.09	17.24	17.18	17.51	17.34	17.31	17.80	2.8%	1.6%	9.2%	
Algeria	0.65	0.65	0.69	0.74	0.77	0.80	0.85	0.83	0.81	0.83	0.88	6.3%	3.1%	0.5%	
Egypt	1.48	1.57	1.46	1.53	1.54	1.65	1.72	1.76	1.64	1.53	1.50	-1.7%	0.9%	0.8%	
Morocco	0.46	0.52	0.55	0.56	0.56	0.53	0.52	0.54	0.57	0.55	0.57	2.6%	1.9%	0.3%	
South Africa	1.05	1.11	1.12	1.15	1.16	1.15	1.20	1.13	1.13	1.16	1.18	2.5%	0.9%	0.6%	
Other Africa	3.14	3.29	3.12	3.35	3.54	3.56	3.58	3.69	3.85	4.01	4.14	3.4%	2.9%	2.1%	
Total Africa	6.79	7.13	6.93	7.31	7.57	7.70	7.87	7.95	7.99	8.07	8.28	2.5%	2.1%	4.3%	
Australia	1.83	1.82	1.94	2.01	2.05	2.07	2.00	2.01	2.10	2.16	2.14	-0.8%	1.6%	1.1%	
Bangladesh	0.15	0.17	0.22	0.23	0.23	0.26	0.27	0.30	0.33	0.38	0.37	-4.2%	8.9%	0.2%	
China	16.69	18.99	19.68	20.63	21.54	22.42	23.90	24.51	25.57	26.58	27.91	5.0%	5.1%	14.5%	
China Hong Kong SAR	0.71	0.77	0.77	0.74	0.75	0.72	0.78	0.81	0.92	0.93	0.97	-6.5%	4.1%	0.5%	
India	6.57	6.72	7.03	7.45	7.50	7.72	8.34	9.15	9.49	9.95	10.24	-2.9%	4.8%	5.3%	
Indonesia	2.65	2.82	3.18	3.27	3.30	3.32	3.07	3.09	3.25	3.38	3.38	0.2%	2.6%	1.8%	
Japan	8.72	8.80	8.82	9.40	8.97	8.52	8.20	7.97	7.85	7.63	7.53	-1.3%	-2.4%	3.9%	
Malaysia	1.29	1.29	1.38	1.45	1.54	1.54	1.43	1.60	1.51	1.54	1.57	2.0%	1.7%	0.8%	
New Zealand	0.31	0.31	0.31	0.31	0.31	0.32	0.33	0.34	0.35	0.36	0.36	0.4%	1.1%	0.2%	
Pakistan	0.89	0.88	0.88	0.86	0.94	0.97	1.06	1.18	1.22	1.02	0.90	-11.4%	2.1%	0.5%	
Philippines	0.60	0.62	0.59	0.61	0.64	0.68	0.77	0.83	0.89	0.89	0.91	1.9%	4.5%	0.5%	
Singapore	2.34	2.57	2.68	2.67	2.69	2.75	2.91	3.02	3.10	3.13	3.06	-2.5%	3.8%	1.6%	
South Korea	4.55	4.61	4.65	4.79	4.77	4.76	5.01	5.40	5.42	5.37	5.30	-1.3%	1.7%	2.7%	
Sri Lanka	0.18	0.18	0.19	0.20	0.17	0.15	0.18	0.21	0.23	0.23	0.25	7.9%	2.8%	0.1%	
Taiwan	2.01	2.05	1.87	1.86	1.91	1.97	1.99	2.04	2.03	2.04	1.93	-5.0%			

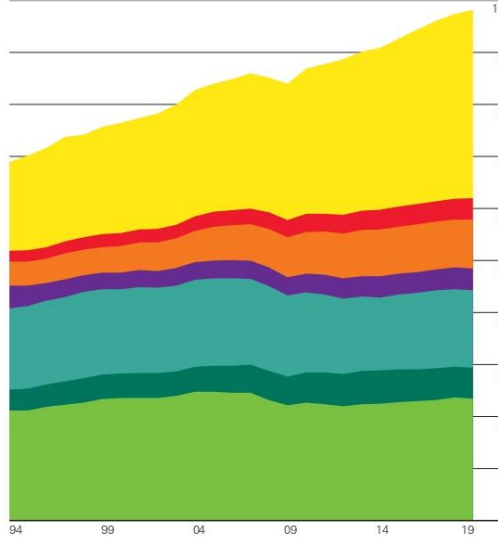
Oil: Production by region

Million barrels daily



Oil: Consumption by region

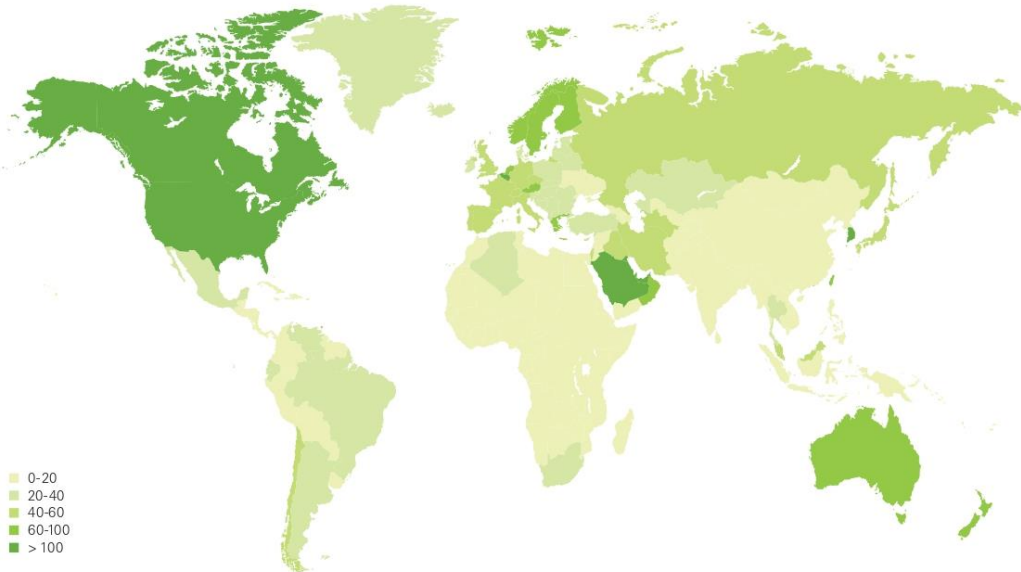
Million barrels daily



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

Oil: Consumption per capita 2019

GJ per capita



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

Oil: Regional consumption – by product group

Thousand barrels daily	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Growth rate per annum		Share 2019
												2019	2008-18	
North America														
Ethane and LPG	2929	3063	3121	3167	3364	3330	3392	3439	3505	3742	3808	1.8%	2.8%	16.2%
Naphtha	304	377	361	331	376	349	333	328	285	291	263	-9.4%	-1.4%	1.1%
Gasoline	9789	9710	9460	9362	9493	9565	9799	9975	9951	9967	9876	-0.9%	0.1%	-42.0%
Jet/kerosene	1571	1619	1637	1587	1631	1676	1768	1840	1920	1963	2012	2.5%	1.2%	8.5%
Diesel/gasoil	4689	4929	4994	4758	4788	5017	4945	4776	4869	5129	4969	-3.1%	-0.1%	21.1%
Fuel oil	801	810	745	662	576	447	418	474	519	478	409	-14.5%	-6.5%	1.7%
Others	2152	2188	2127	2139	2157	2098	2156	2128	2111	2122	2199	3.6%	-0.9%	9.3%
Total North America	22235	22697	22445	22006	22385	22483	22810	22961	23160	23692	23536	-0.7%	0.2%	100.0%
<i>of which: US</i>														
Ethane and LPG	2043	2166	2201	2247	2436	2389	2446	2463	2533	2867	2925	2.0%	3.9%	15.1%
Naphtha	246	256	254	236	270	231	223	219	228	233	207	-11.3%	-0.6%	1.1%
Gasoline	8291	8168	7926	7858	7993	8056	8280	8394	8393	8400	8338	-0.7%	-	43.0%
Jet/kerosene	1411	1452	1438	1403	1440	1479	1555	1623	1687	1712	1747	2.0%	1.0%	9.0%
Diesel/gasoil	3809	3995	4022	3816	3838	4060	4005	3845	3925	4121	4073	-1.2%	-0.3%	21.0%
Fuel oil	508	532	459	367	317	256	258	325	341	317	272	-14.1%	-6.3%	1.4%
Others	1723	1754	1683	1666	1711	1665	1757	1749	1776	1777	1837	3.4%	-0.6%	9.5%
Total US	18030	18324	17983	17594	18006	18136	18524	18618	18883	19428	19400	-0.1%	0.3%	100.0%
S. & Cent. America														
Ethane and LPG	645	639	675	712	712	705	697	713	723	723	728	0.7%	1.1%	12.3%
Naphtha	182	187	184	185	161	157	173	160	177	149	151	1.4%	-1.3%	2.5%
Gasoline	1181	1265	1390	1458	1511	1534	1490	1523	1533	1446	1435	-0.8%	2.5%	24.2%
Jet/kerosene	248	272	285	299	306	321	325	330	331	344	349	1.3%	3.3%	5.9%
Diesel/gasoil	1953	2030	2123	2223	2335	2325	2293	2213	2205	2211	2230	0.8%	1.5%	37.6%
Fuel oil	740	716	686	697	679	693	690	629	567	543	520	-4.3%	-3.6%	8.8%
Others	670	682	719	661	714	684	629	568	542	530	512	-3.5%	-2.8%	8.6%
Total S. & Cent. America	5519	5791	6061	6234	6418	6420	6298	6136	6078	5946	5923	-0.4%	0.6%	100.0%
<i>of which: Brazil</i>														
Ethane and LPG	257	267	290	300	316	307	300	303	309	308	313	1.4%	1.4%	13.0%
Naphtha	168	173	168	169	147	142	155	145	163	135	136	0.9%	-1.5%	5.7%
Gasoline	329	393	468	514	549	575	522	541	556	483	481	-0.5%	4.0%	20.1%
Jet/kerosene	94	108	120	126	125	129	127	116	115	124	120	-2.6%	3.1%	5.0%
Diesel/gasoil	796	849	901	961	1009	1034	968	933	944	959	967	3.0%	2.5%	41.2%
Fuel oil	179	152	126	139	161	149	149	112	110	90	91	-3.1%	-4.9%	3.8%
Others	314	329	359	315	371	373	321	286	283	278	270	-3.1%	-1.4%	11.2%
Total Brazil	2078	2271	2432	2509	2655	2721	2559	2436	2481	2377	2398	0.9%	1.3%	100.0%
Europe														
Ethane and LPG	1021	1017	1007	997	1125	1139	1157	1191	1223	1239	1212	-2.2%	1.8%	8.1%
Naphtha	1053	1123	1009	974	959	920	894	901	932	926	877	-5.3%	-1.3%	5.9%
Gasoline	2451	2313	2212	2098	2029	1995	1945	1949	1952	1943	1958	0.8%	-2.6%	13.1%
Jet/kerosene	1254	1249	1255	1227	1247	1278	1347	1387	1474	1537	1570	2.1%	1.4%	10.5%
Diesel/gasoil	6284	6381	6256	6138	6201	6102	6386	6493	6646	6602	6650	0.7%	0.1%	44.6%
Fuel oil	1481	1338	1281	1166	1041	969	923	965	975	964	931	-3.4%	-5.1%	6.3%
Others	2018	1990	1945	1860	1692	1629	1708	1782	1789	1725	1697	-1.6%	-2.3%	11.4%
Total Europe	15561	15409	14976	14458	14296	14032	14360	14669	14991	14936	14696	-0.3%	-0.9%	100.0%
<i>of which: European Union</i>														
Ethane and LPG	821	810	798	793	910	926	929	957	982	989	959	-3.0%	1.6%	7.4%
Naphtha	999	1069	965	929	910	877	840	843	868	871	816	-6.3%	-1.6%	6.3%
Gasoline	2140	2019	1933	1832	1773	1763	1732	1736	1747	1745	1758	0.7%	-2.3%	13.6%
Jet/kerosene	1150	1152	1157	1130	1135	1135	1171	1213	1295	1348	1372	1.8%	1.0%	10.6%
Diesel/gasoil	5553	5634	5491	5349	5383	5304	5538	5618	5725	5683	5713	0.5%	-0.2%	44.2%
Fuel oil	1303	1210	1165	1060	927	858	815	854	854	862	833	-3.3%	-5.1%	6.5%
Others	1813	1776	1750	1656	1488	1451	1482	1525	1525	1478	1461	-1.2%	-2.9%	11.3%
Total European Union	13779	13669	13258	12740	12526	12315	12507	12746	12996	12976	12913	-0.5%	-1.1%	100.0%
CIS														
Ethane and LPG	389	379	435	460	517	561	579	621	641	681	732	7.5%	5.9%	17.3%
Naphtha	178	191	189	173	194	180	191	201	226	246	238	-3.2%	2.4%	5.6%
Gasoline	925	968	981	1030	1050	1073	1053	1044	1037	1050	1043	-0.6%	1.3%	24.7%
Jet/kerosene	261	275	308	314	298	314	283	279	307	326	335	2.7%	1.4%	7.9%
Diesel/gasoil	791	873	942	942	945	906	889	915	942	1013	1060	4.6%	1.6%	25.1%
Fuel oil	343	336	358	354	363	432	366	373	341	346	351	1.4%	-0.8%	8.3%
Others	600	544	625	662	546	632	591	602	528	497	469	-5.5%	-1.5%	11.1%
Total CIS	3487	3566	3838	3934	3914	4097	3952	4036	4021	4157	4227	1.7%	1.5%	100.0%
Middle East														
Ethane and LPG	1309	1569	1743	1840	1800	1903	1918	2054	2100	2182	2194	0.5%	6.7%	23.3%
Naphtha	288	296	336	344	324	369	382	389	431	482	503	4.5%	5.4%	5.3%
Gasoline	1340	1369	1423	1501	1585	1611	1642	1688	1802	1818	1867	2.7%	3.6%	19.8%
Jet/kerosene	447	437	434	436	488	467	538	565	542	540	564	4.4%	2.0%	6.0%
Diesel/gasoil	1856	1846	1973	2075	2150	2069	1904	1805	1701	1661	1773	6.7%	-1.1%	18.8%
Fuel oil	1902	1938	1953	1993	2066	2099	2127	2118	2059	2007	2022	0.7%	1.4%	21.5%
Others	589	532	430	453	457	475	476	572	522	484	493	1.8%	-2.6%	5.2%
Total Middle East	7730	7987	8293	8642	8868	8993	8987	9191	9156	9174	9416	2.6%	2.2%	100.0%
Africa														
Ethane and LPG	351	363	372	381	386	387	386	399	411	425	463	9.2%	2.2%	11.3%
Naphtha	30	27	7	3	4	4	4	4	4	4	4	0.4%	-18.0%	0.1%
Gasoline	772	810	811	867	881	900	965	1037	1073	1099	1122	2.1%	4.1%	27.4%
Jet/kerosene	294	320	303	306	317	299	263	254	260	260	262	0.9%	-1.3%	6.4%
Diesel/gasoil	1219	1304	1315	1375	1476	1535	1601	1580	1614	1636	1678	2.6%	3.5%	41.0%
Fuel oil	445	461	395	443	442	440	429	406	376	356	355	-0.1%	-2.0%	8.7%
Others	211	203	203	201	206	207	212	214	199	206	211	2.3%	0.2%	5.2%
Total Africa	3322	3489	3405	3575	3712	3773	3859	3894	3938	3986	4096	2.8%	2.2%	100.0%

*less than 0.05%.
Table continues on next page.

Oil: Regional consumption – by product group (continued)

Thousand barrels daily	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Growth rate per annum		Share 2019
												2019	2008-18	
Asia Pacific														
Ethane and LPG	2636	2771	2880	2969	3061	3233	3374	3723	4009	4172	4402	5.5%	5.1%	12.2%
Naphtha	3258	3559	3571	3729	3863	4022	4281	4379	4567	4694	4740	1.0%	4.1%	13.1%
Gasoline	4353	4650	4829	5103	5481	5601	6132	6383	6612	6770	7023	3.7%	4.8%	19.4%
Jet/kerosene	2053	2194	2205	2242	2316	2352	2447	2589	2723	2872	2888	0.6%	3.0%	8.0%
Diesel/gasoil	7320	7725	8122	8518	8647	8705	8859	8901	9135	9346	9595	2.7%	2.6%	26.5%
Fuel oil	3043	3047	3113	3218	2976	2813	2807	2854	2739	2621	2404	-8.3%	-2.5%	6.6%
Others	3565	3971	4082	4157	4215	4380	4443	4689	4884	4982	5125	2.9%	4.4%	14.2%
Total Asia Pacific	26228	27917	28802	29935	30560	31105	32344	33519	34669	35457	36178	2.0%	3.2%	100.0%
of which: China														
Ethane and LPG	640	677	691	689	771	884	1028	1207	1351	1432	1578	10.2%	8.6%	11.2%
Naphtha	598	778	811	868	914	1032	1115	1188	1277	1384	1391	0.5%	9.9%	9.9%
Gasoline	1412	1591	1738	1863	2143	2236	2601	2707	2840	2921	3087	5.7%	7.6%	22.0%
Jet/kerosene	363	437	459	495	546	588	659	728	816	927	974	5.0%	11.4%	6.9%
Diesel/gasoil	2761	3005	3196	3453	3503	3506	3538	3418	3440	3492	3690	5.7%	2.4%	26.3%
Fuel oil	662	666	588	560	564	592	591	556	528	566	604	6.8%	-2.4%	4.3%
Others	1804	2235	2257	2243	2227	2295	2380	2444	2591	2652	2731	3.0%	5.6%	19.4%
Total China	8240	9390	9739	10170	10668	11134	11911	12248	12842	13375	14056	5.1%	5.4%	100.0%
of which: India														
Ethane and LPG	470	506	544	557	565	625	684	765	894	955	1023	7.1%	7.9%	19.4%
Naphtha	283	255	270	289	279	267	315	328	306	345	325	-5.9%	0.4%	6.2%
Gasoline	285	317	331	349	380	415	471	520	569	620	674	8.7%	9.8%	12.8%
Jet/kerosene	299	301	300	279	274	276	280	274	249	254	235	-7.3%	-1.6%	4.5%
Diesel/gasoil	1140	1218	1301	1406	1410	1417	1493	1573	1629	1703	1729	1.6%	4.9%	32.8%
Fuel oil	222	199	178	147	117	107	113	136	122	120	112	-6.5%	-6.1%	2.1%
Others	600	583	618	713	756	798	875	1035	1092	1115	1172	5.1%	7.7%	22.2%
Total India	3298	3378	3542	3740	3781	3906	4230	4632	4860	5112	5271	3.1%	5.0%	100.0%
of which: Japan														
Ethane and LPG	500	492	496	536	508	492	443	419	424	399	351	-12.0%	-2.9%	9.2%
Naphtha	644	690	655	633	679	651	706	663	694	655	759	15.9%	0.4%	19.9%
Gasoline	990	999	973	974	944	914	903	894	879	865	840	-2.9%	-1.3%	22.0%
Jet/kerosene	543	550	527	539	528	516	495	504	514	499	485	-2.7%	-1.5%	12.7%
Diesel/gasoil	837	841	816	821	817	803	786	792	781	781	770	-1.4%	-1.6%	20.2%
Fuel oil	450	442	577	624	646	532	433	371	284	269	210	-21.7%	-9.2%	5.5%
Others	425	422	391	367	387	384	373	370	393	388	397	2.3%	-2.3%	10.4%
Total Japan	4389	4434	4435	4694	4508	4292	4138	4006	3971	3855	3812	-1.1%	-2.3%	100.0%
World														
Ethane and LPG	9281	9802	10234	10525	10965	11259	11503	12140	12612	13163	13540	2.9%	4.0%	13.8%
Naphtha	5292	5759	5656	5738	5881	6000	6259	6362	6621	6790	6775	-0.2%	2.7%	6.9%
Gasoline	20811	21084	21107	21420	22030	22279	23024	23600	23960	24094	24324	1.0%	1.5%	24.8%
Jet/kerosene	6127	6366	6427	6410	6603	6707	6970	7245	7556	7842	7979	1.8%	1.9%	8.1%
Diesel/gasoil	24012	25087	25725	26028	26542	26660	26879	26882	27112	27599	27955	1.3%	1.1%	28.4%
Fuel oil	8754	8645	8541	8532	8143	7833	7761	7819	7576	7316	6992	-4.4%	-2.3%	7.1%
Others	9805	10112	10130	10132	9988	10105	10214	10556	10576	10546	10706	1.5%	0.7%	10.9%
Total World	84083	86856	87820	88784	90152	90903	92610	94404	96013	97348	98272	0.9%	1.3%	100.0%
OECD														
Ethane and LPG	4828	4946	4972	5047	5321	5273	5283	5399	5487	5717	5736	0.3%	1.8%	12.5%
Naphtha	2886	3106	3010	3008	3072	3019	3074	3071	3173	3112	3104	-0.3%	0.8%	6.8%
Gasoline	13650	13450	13075	12885	12944	12970	13179	13365	13334	13328	13236	-0.7%	-0.3%	28.9%
Jet/kerosene	3679	3752	3751	3692	3752	3817	3970	4119	4306	4412	4473	1.4%	1.1%	9.8%
Diesel/gasoil	12388	12736	12701	12408	12515	12644	12895	12847	13115	13332	13212	-0.9%	0.1%	28.8%
Fuel oil	2926	2791	2795	2851	2447	2092	1924	1987	1906	1847	1643	-11.0%	-6.3%	3.6%
Others	4798	4765	4672	4565	4414	4277	4374	4423	4425	4367	4418	1.2%	-1.6%	9.6%
Total OECD	45155	45547	44976	44457	44465	44092	44700	45210	45747	46115	45822	-0.6%	-0.3%	100.0%
Non-OECD														
Ethane and LPG	4453	4857	5262	5478	5644	5985	6219	6741	7125	7445	7804	4.8%	6.0%	14.9%
Naphtha	2406	2653	2647	2730	2809	2981	3184	3291	3448	3678	3671	-0.2%	4.6%	7.0%
Gasoline	7161	7634	8031	8534	9086	9310	9845	10235	10626	10765	11068	3.0%	4.5%	21.1%
Jet/kerosene	2448	2614	2675	2717	2850	2890	3000	3126	3251	3430	3506	2.2%	2.2%	6.7%
Diesel/gasoil	11625	12351	13024	13620	14028	14016	13985	13835	13997	14266	14743	3.3%	3.2%	28.1%
Fuel oil	5828	5854	5746	5681	5696	5801	5837	5832	5689	5469	5349	-2.2%	-0.5%	10.2%
Others	5008	5346	5458	5566	5573	5828	5840	6133	6151	6179	6267	1.7%	2.8%	12.0%
Total Non-OECD	38927	41308	42844	44327	45687	46811	47910	49194	50266	51233	52450	2.4%	3.1%	100.0%

*Less than 0.05%.

Notes: Gasoline includes motor and aviation gasoline, gasolines and light distillate feedstock (LDF).

Diesel/gasoil includes marine gasoil.

Fuel oil includes marine bunkers and crude oil used directly for fuel.

Others consists of refinery gas, solvents, petroleum coke, lubricants, bitumen, wax, other refined products and refinery fuel and loss.

Annual changes and shares of total are calculated using thousand barrels daily figures.

Spot crude prices

US dollars per barrel	Dubai \$/bbl*	Brent \$/bbl†	Nigerian Forcados \$/bbl	West Texas Intermediate \$/bbl‡
1984	28.06	28.78	28.14	29.39
1985	27.53	27.56	27.75	27.98
1986	13.10	14.43	14.46	15.05
1987	16.95	13.44	13.39	13.19
1988	13.18	14.92	15.00	15.98
1989	15.65	18.23	18.30	19.67
1990	20.26	23.73	23.85	24.46
1991	16.63	20.00	20.11	21.53
1992	17.17	19.32	19.61	20.57
1993	14.33	16.97	17.41	18.45
1994	14.74	15.82	16.25	17.21
1995	16.10	17.02	17.26	18.42
1996	18.52	20.67	21.16	22.16
1997	18.23	19.09	19.33	20.61
1998	12.21	12.72	12.62	14.39
1999	17.25	17.97	18.00	19.31
2000	26.20	23.50	23.42	30.37
2001	22.81	24.44	24.23	25.93
2002	23.74	25.02	25.04	26.16
2003	26.78	28.83	28.66	31.06
2004	33.64	38.27	38.13	41.49
2005	49.35	54.52	55.69	56.59
2006	61.50	65.14	67.07	66.04
2007	68.19	72.39	74.48	72.20
2008	94.34	97.26	101.43	100.06
2009	61.39	61.67	63.35	61.92
2010	78.06	79.50	81.05	79.45
2011	106.18	111.26	113.65	95.04
2012	109.08	111.67	114.21	94.13
2013	105.47	108.66	111.95	97.99
2014	97.07	98.95	101.35	93.28
2015	51.20	52.39	54.41	48.71
2016	41.19	43.73	44.54	43.34
2017	53.13	54.19	54.31	50.79
2018	69.51	71.31	72.47	65.20
2019	63.43	64.21	64.95	57.03

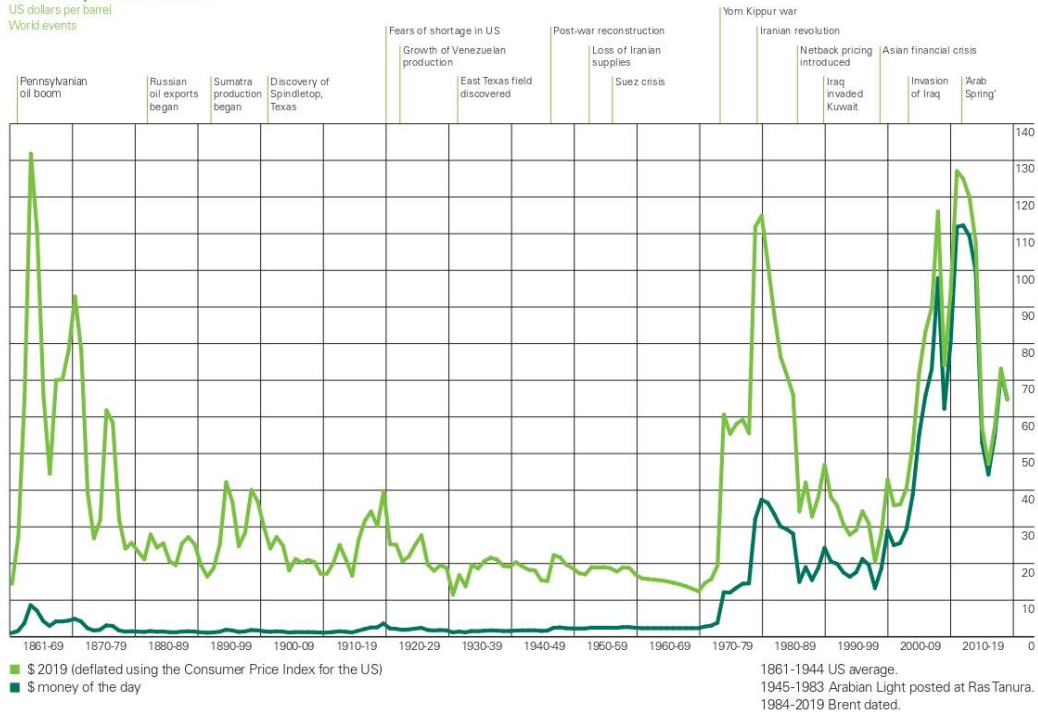
*1984-1985 Arabian Light, 1986-2019 Dubai dated.
 †1984-2019 Brent dated.
 ‡1984-2019 Spot WTI (Cushing) prices.

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

Crude oil prices 1861-2019

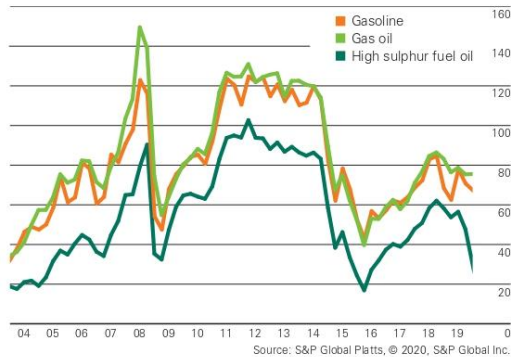
US dollars per barrel

World events



Oil product prices (Rotterdam)

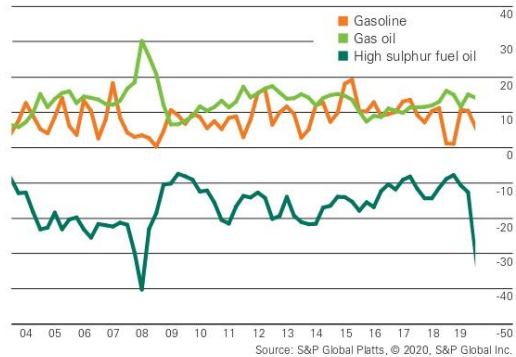
US dollars per barrel



Product differentials to crude

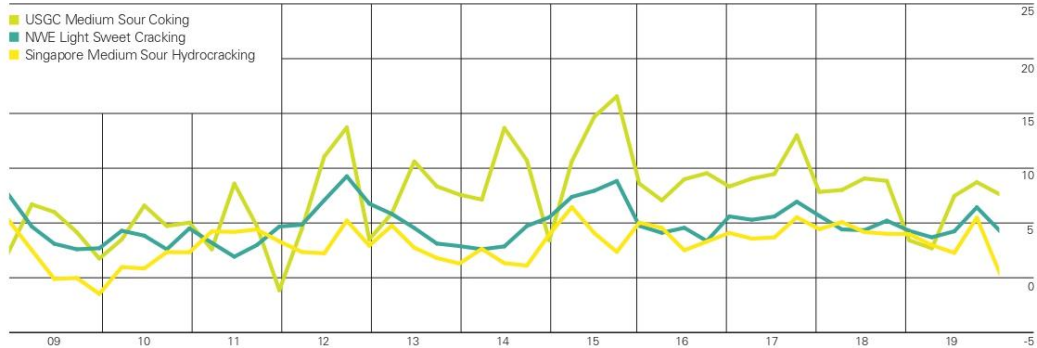
(Rotterdam products minus Dated Brent)

US dollars per barrel



Regional refining margins

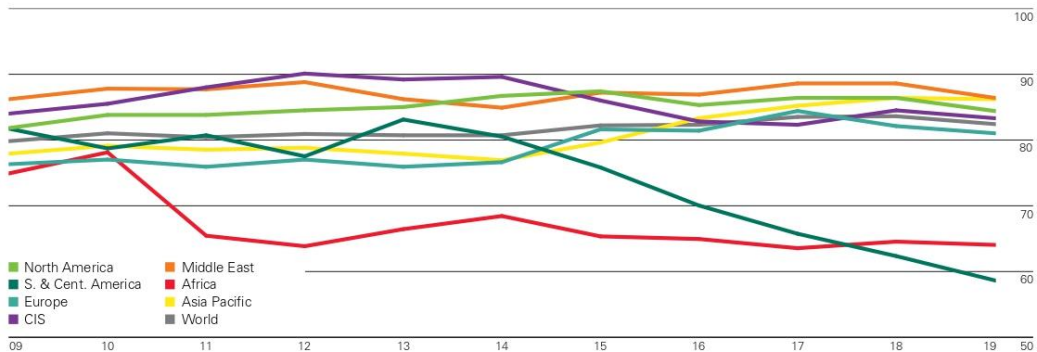
US dollars per barrel



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

Refinery utilization

Percentage (based on average annual capacity)



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

Oil: Refinery throughput

Thousand barrels daily*	2009-2019										Growth rate per annum			
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019	2008-18	Share 2019
Canada	1731	1770	1681	1753	1719	1615	1640	1594	1757	1653	1822	10.2%	-0.7%	2.2%
Mexico	1184	1184	1166	1199	1223	1155	1064	933	767	609	592	-2.8%	-7.3%	0.7%
US	14336	14724	14799	14997	15306	15844	16183	16185	16681	16962	16562	-2.4%	1.5%	20.0%
Total North America	17251	17676	17646	17949	18248	18614	18887	18713	19105	19224	18976	-1.3%	0.8%	22.9%
Argentina	532	531	516	530	527	526	536	511	500	470	476	1.2%	-2.0%	0.6%
Brazil	1781	1787	1813	1889	2035	2085	1972	1812	1741	1733	1751	1.0%	-0.2%	2.1%
Chile	192	159	173	164	174	174	165	163	172	172	186	8.2%	-1.7%	0.2%
Colombia	302	300	306	305	284	247	244	339	355	363	384	0.2%	2.0%	0.5%
Curacao	183	64	164	165	170	189	178	156	84	29	4	-85.1%	n/a	n/a
Ecuador	156	137	156	152	141	125	121	150	156	159	142	-10.7%	0.2%	0.2%
Peru	199	201	193	190	186	188	188	194	213	209	192	-7.9%	1.8%	0.2%
Trinidad & Tobago	152	126	137	107	132	105	125	148	131	99	-	-100.0%	-4.1%	-
Venezuela	961	969	991	936	952	920	863	654	544	306	135	-55.8%	-11.2%	0.2%
Other S. & Cent. America	796	700	704	326	286	277	275	231	201	249	241	-3.1%	-12.6%	0.3%
Total S. & Cent. America	5253	4974	5153	4764	4887	4836	4667	4359	4097	3808	3512	-7.8%	-3.6%	4.2%
Austria	169	158	168	170	174	173	179	164	162	180	184	2.1%	0.2%	0.2%
Belgium	629	668	598	634	555	645	644	640	685	663	693	4.5%	-0.2%	0.8%
Bulgaria	125	110	102	118	113	104	121	125	136	118	137	16.1%	-1.9%	0.2%
Czech Republic	148	159	143	145	134	151	145	109	158	151	158	-4.3%	-0.9%	0.2%
Denmark	157	146	137	153	144	139	147	140	151	152	153	0.8%	-0.2%	0.2%
Finland	220	211	225	215	227	225	197	226	226	233	240	3.1%	0.5%	0.3%
France	1449	1314	1313	1138	1117	1096	1152	1122	1149	1085	978	-9.9%	-4.3%	1.2%
Germany	2026	1915	1876	1901	1857	1833	1875	1887	1870	1775	1761	-0.8%	-1.9%	2.1%
Greece	346	393	331	410	399	416	436	464	483	489	462	-5.4%	3.1%	0.6%
Hungary	127	128	132	122	120	131	130	133	131	141	137	-3.3%	0.1%	0.2%
Italy	1614	1673	1570	1475	1259	1198	1347	1293	1399	1346	1343	-0.3%	-2.5%	1.6%
Lithuania	174	190	189	181	192	160	170	187	197	195	191	-1.7%	0.2%	0.2%
Netherlands	1104	1156	1115	1110	1065	1090	1157	1172	1180	1192	1217	2.1%	0.6%	1.5%
Norway	278	259	289	287	292	274	293	230	281	305	281	-7.7%	0.9%	0.3%
Poland	408	458	482	505	488	486	532	517	508	540	546	1.1%	2.6%	0.7%
Portugal	209	227	206	221	221	217	228	279	264	252	226	-10.4%	-0.4%	0.3%
Romania	247	217	194	182	189	194	208	228	225	232	244	5.3%	-2.0%	0.3%
Slovakia	114	110	120	108	116	105	119	115	112	109	103	-5.9%	-0.7%	0.1%
Spain	1057	1060	1051	1186	1168	1185	1306	1302	1326	1363	1318	-3.3%	1.5%	1.6%
Sweden	394	406	374	417	332	380	401	395	392	406	337	-17.0%	-0.2%	0.4%
Turkey	375	392	394	398	421	406	526	531	542	472	675	42.9%	-0.4%	0.8%
Ukraine	255	249	206	108	85	69	64	64	77	59	64	8.1%	-13.1%	0.1%
United Kingdom	1440	1395	1433	1349	1197	1125	1118	1071	1073	1041	1066	-2.4%	-3.8%	1.3%
Other Europe	199	184	158	132	136	128	141	148	165	166	121	-26.9%	-0.9%	0.1%
Total Europe	13414	13327	12853	12793	12173	12082	12810	12666	13032	12787	12740	-0.4%	-1.2%	15.4%
Azerbaijan	121	124	127	124	132	135	130	120	118	122	124	1.8%	-1.8%	0.1%
Belarus	434	330	411	434	425	448	462	372	364	366	336	-8.0%	-1.5%	0.4%
Kazakhstan	235	257	326	331	341	361	342	339	355	374	392	5.0%	4.7%	0.5%
Russian Federation	4765	5018	5185	5438	5636	5926	5773	5715	5703	5864	5829	-0.6%	2.1%	7.0%
Turkmenistan	152	170	164	156	146	136	127	118	125	117	122	4.0%	-2.3%	0.1%
Uzbekistan	88	73	69	62	61	50	57	57	58	70	60	-13.9%	-2.9%	0.1%
Other CIS	3	3	3	2	2	4	7	8	9	11	7	-31.0%	12.0%	n/a
Total CIS	5798	5975	6286	6548	6742	7060	6899	6730	6732	6923	6871	-0.7%	1.8%	8.3%
Bahrain	256	265	259	263	264	257	266	258	262	260	263	1.1%	0.1%	0.3%
Iran	1626	1830	1874	1933	2000	1941	1868	1875	1959	2022	2208	9.2%	1.3%	2.7%
Iraq	417	520	543	579	598	487	409	440	527	596	611	2.4%	2.3%	0.7%
Israel	217	217	218	220	221	226	232	213	223	232	242	0.2%	-	-
Kuwait	869	892	852	916	873	879	905	841	686	679	663	-2.4%	-2.8%	0.8%
Oman	203	167	201	193	187	180	190	178	232	304	290	-4.4%	3.6%	0.3%
Qatar	158	294	278	292	270	261	253	280	379	397	396	-0.2%	10.6%	0.5%
Saudi Arabia	1928	1922	1884	1953	1876	2201	2447	2753	2802	2770	2601	-6.1%	3.2%	3.1%
United Arab Emirates	492	571	635	638	650	643	1098	1078	1119	1096	1059	0.3%	8.3%	1.3%
Other Middle East	386	381	349	268	238	230	181	144	161	153	165	8.1%	-9.0%	0.2%
Total Middle East	6755	7059	7092	7254	7177	7306	7847	8059	8350	8514	8537	0.3%	2.1%	10.3%
Algeria	475	548	520	478	492	615	591	584	573	601	569	-5.2%	3.4%	0.7%
Egypt	598	580	523	534	514	530	530	509	508	519	562	8.2%	-1.7%	0.7%
Morocco	93	110	103	111	111	104	53	-	-	-	-	n/a	-100.0%	-
Nigeria	49	96	108	92	97	64	22	62	81	44	7	-83.0%	-8.6%	n/a
South Africa	398	400	393	413	422	440	453	474	447	455	453	-0.4%	0.9%	0.5%
Other Africa	696	701	512	586	594	444	455	459	429	446	459	2.9%	-4.7%	0.6%
Total Africa	2309	2434	2160	2214	2230	2197	2103	2087	2038	2065	2051	-0.7%	-1.5%	2.5%
Australia	577	606	627	600	588	538	427	433	419	477	468	-2.0%	-1.8%	0.6%
China	7452	8408	8686	9199	9599	10155	10684	11084	11744	12483	13432	7.6%	6.2%	16.2%
India	3641	3899	4085	4302	4462	4475	4561	4930	5010	5154	5119	-0.7%	4.8%	6.2%
Indonesia	900	853	880	820	822	848	836	885	885	916	918	0.2%	0.1%	1.1%
Japan	3627	3619	3410	3400	3453	3289	3258	3280	3215	3059	3047	-4.4%	-2.5%	3.7%
Malaysia	554	470	516	575	557	552	514	574	570	566	586	3.4%	0.1%	0.7%
New Zealand	95	99	108	109	105	101	109	108	108	104	110	5.7%	0.5%	0.1%
Pakistan	209	190	193	192	223	232	257	242	261	275	243	-11.5%	2.0%	0.3%
Philippines	147	181	190	170	158	168	212	216	211	237	180	-24.0%	2.6%	0.2%
Singapore	844	979	1035	1020	936	839	901	929	994	974	930	-4.5%	-1.7%	1.1%
South Korea	2297	2390	2533	2582	2484	2516	2784	2928	3061	3031	2922	-3.6%	2.5%	3.5%
Taiwan	956	876	809	897	847	850	838	861	848	889	890	0.1%	-0.1%	1.1%
Thailand	938	963	934	986	1056	1005	1107	1056	1093	1131	1025	-9.3%	2.0%	1.2%
Vietnam	28	121	137	126	148	129	155	155	141	221	276	25.2%	36.3%	0.3%

Oil: Refining capacity

											Growth rate per annum		Share	
Thousand barrels daily*	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019	2008-18	2019
Canada	1976	1913	2005	2015	1929	1929	1931	1934	1970	2025	2054	1.4%	0.4%	2.0%
Mexico	1463	1463	1606	1606	1606	1522	1522	1522	1546	1558	1558	-	0.6%	1.5%
US	17597	17736	17367	17823	17925	17967	18317	18617	18567	18762	18974	1.1%	0.6%	18.7%
Total North America	21036	21112	20977	21443	21460	21418	21770	22073	22082	22345	22586	1.1%	0.6%	22.3%
Argentina	625	625	625	657	657	657	657	657	657	580	580	-	-0.8%	0.6%
Brazil	1992	1992	2014	2004	2097	2238	2281	2289	2285	2285	2290	0.2%	1.5%	2.3%
Chile	242	242	250	254	254	258	258	258	258	258	258	-	0.6%	0.3%
Colombia	336	336	336	336	336	336	421	421	421	421	421	-	2.6%	0.4%
Curacao	320	320	320	320	320	320	320	320	320	320	320	-	-	0.3%
Ecuador	175	175	175	175	175	175	175	175	175	175	175	-	-	0.2%
Peru	252	252	252	252	253	253	253	253	253	253	253	-	1.0%	0.2%
Trinidad & Tobago	165	165	165	165	165	165	165	165	-	-	-	n/a	-100.0%	-
Venezuela	1303	1303	1303	1303	1303	1303	1303	1303	1303	1303	1303	-	-	1.3%
Other S. & Cent. America	900	901	1013	356	361	376	384	384	384	384	384	-	-10.6%	0.4%
Total S. & Cent. America	6310	6311	6453	5822	5921	6081	6217	6225	6221	5979	5984	0.1%	-0.9%	5.9%
Austria	201	201	193	193	193	193	193	193	193	193	193	-	-0.4%	0.2%
Belgium	786	787	788	753	776	776	776	776	776	776	776	-	-0.1%	0.8%
Bulgaria	180	195	195	195	195	195	195	195	195	195	195	-	1.1%	0.2%
Czech Republic	183	193	193	175	175	175	175	175	175	175	175	-	-1.0%	0.2%
Denmark	189	189	181	181	181	180	180	180	181	181	181	-	-0.4%	0.2%
Finland	261	261	261	261	261	261	261	261	261	261	261	-	-	0.3%
France	1847	1702	1610	1513	1375	1375	1375	1245	1245	1245	1245	-	-4.5%	1.2%
Germany	2362	2091	2077	2097	2061	2077	2049	2051	2069	2085	2085	-	-1.3%	2.1%
Greece	425	490	485	498	498	498	528	528	528	528	528	-	2.2%	0.5%
Hungary	165	165	165	165	165	165	165	165	165	165	165	-	-	0.2%
Italy	2396	2396	2276	2098	1861	1900	1900	1900	1900	1900	1900	-	-2.3%	1.9%
Lithuania	241	241	241	241	241	241	241	241	241	241	241	-	-	0.2%
Netherlands	1280	1274	1276	1279	1279	1279	1298	1298	1299	1299	1309	0.8%	0.1%	1.3%
Norway	316	316	329	342	342	342	342	342	342	342	342	-	0.8%	0.3%
Poland	491	560	580	582	582	582	581	581	581	581	581	-	1.7%	0.6%
Portugal	306	306	306	330	330	330	330	330	330	330	330	-	-	0.3%
Romania	283	247	229	214	235	228	239	256	247	254	252	-0.9%	-3.4%	0.2%
Slovakia	122	122	122	122	122	122	122	122	122	122	122	-	-	0.1%
Spain	1362	1421	1542	1546	1546	1546	1562	1562	1562	1564	1586	1.4%	1.4%	1.6%
Sweden	454	454	454	454	454	454	454	454	454	454	454	-	-	0.4%
Turkey	613	613	596	596	596	596	596	596	818	822	822	0.5%	2.9%	0.8%
Ukraine	165	484	484	484	272	250	250	250	250	250	250	-	-7.8%	0.2%
United Kingdom	1757	1757	1787	1498	1337	1337	1277	1227	1227	1227	1227	-	-3.9%	1.2%
Other Europe	420	420	404	426	376	376	376	376	358	358	358	-	-1.1%	0.4%
Total Europe	17447	17102	17000	16225	15829	15693	15669	15448	15426	15686	15721	0.2%	-1.2%	15.5%
Azerbaijan	205	205	205	205	205	205	205	205	205	120	120	-	-5.2%	0.1%
Belarus	460	460	460	460	460	460	460	460	490	520	520	-	1.2%	0.5%
Kazakhstan	330	330	330	330	350	350	350	350	360	390	400	2.6%	1.7%	0.4%
Russian Federation	5425	5563	5721	5816	6279	6417	6523	6594	6596	6596	6721	1.9%	2.0%	6.6%
Turkmenistan	251	251	251	251	251	251	271	271	271	271	271	-	0.8%	0.3%
Uzbekistan	232	232	232	232	232	232	232	232	232	232	232	-	-	0.2%
Other CIS	10	14	10	10	12	29	38	39	42	42	45	7.1%	15.3%	0.2%
Total CIS	6913	7055	7209	7304	7789	7944	8079	8151	8196	8171	8309	1.7%	1.7%	8.2%
Bahrain	260	260	260	260	260	260	260	260	260	260	260	-	-	0.3%
Iran	1860	1860	1860	1952	1985	1985	1985	1985	2130	2240	2405	7.4%	2.2%	2.4%
Iraq	853	914	935	971	823	791	763	779	779	849	919	8.2%	1.4%	0.9%
Israel	275	280	292	292	294	301	301	301	301	301	301	-	0.9%	0.3%
Kuwait	936	936	936	936	936	936	936	936	736	736	736	-	-2.4%	0.3%
Oman	222	222	222	222	222	222	222	222	304	334	334	-	4.2%	0.3%
Qatar	283	283	283	283	283	283	283	429	429	429	429	-	12.1%	0.4%
Saudi Arabia	2109	2109	2107	2107	2507	2899	2899	2901	2826	2835	2835	-	3.0%	2.8%
United Arab Emirates	702	702	707	712	712	728	1149	1149	1239	1239	1307	6.3%	6.1%	1.3%
Other Middle East	496	496	496	496	382	382	382	382	496	496	496	-	-	0.5%
Total Middle East	7996	8062	8098	8231	8404	8787	9180	9344	9490	9709	10022	3.2%	2.4%	9.9%
Algeria	554	554	652	652	647	651	651	651	657	657	657	-	4.0%	0.6%
Egypt	810	810	810	810	810	810	810	810	810	795	795	-	-0.2%	0.8%
Morocco	131	131	131	201	201	201	201	201	201	201	201	-	4.4%	0.2%
Nigeria	110	211	336	336	336	339	339	339	339	344	350	1.7%	3.2%	0.3%
South Africa	520	520	520	520	520	520	520	520	520	520	520	-	-	0.5%
Other Africa	938	939	980	980	690	692	692	672	672	677	677	-	-3.2%	0.7%
Total Africa	3063	3165	3429	3499	3203	3213	3213	3213	3199	3194	3200	0.2%	0.3%	3.2%
Australia	734	740	742	663	662	536	443	452	454	454	455	0.3%	4.7%	0.4%
China	11334	12323	13015	13681	14503	15253	15024	14895	15231	15655	16199	3.5%	4.2%	16.0%
India	3574	3703	3795	4279	4319	4307	4620	4699	4972	5008	5008	0.7%	5.2%	4.9%
Indonesia	1099	1099	1099	1099	1099	1099	1111	1111	1111	1084	1094	-	-	1.1%
Japan	4630	4291	4274	4254	4123	3749	3721	3600	3243	3343	3343	-	-3.2%	3.3%
Malaysia	572	582	601	606	612	612	612	618	625	625	625	-	1.0%	0.6%
New Zealand	136	136	136	136	136	136	136	136	136	136	136	-	2.8%	0.1%
Pakistan	276	279	279	275	390	390	389	389	401	401	401	-	3.9%	0.4%
Philippines	267	264	261	261	270	271	271	271	271	271	271	-	-	0.3%
Singapore	1427	1427	1427	1422	1414	1514	1514	1514	1514	1514	1514	-	0.6%	1.5%
South Korea	2746	2774	2864	2878	2878	3123	3128	3259	3298	3346	3393	1.4%	2.1%	3.3%
Taiwan	1197	1197	1197	1197	1197	1197	988	988	1083	1083	1083	-	-1.0%	1.1%
Thailand	1236	1230	1230	1230	1237	1252	1252	1235	1235	1235	1235	-	0.6%	1.2%
Vietnam	159	159	159	159	159	159	159	163	167	367	367	-	42.0%	0.4%
Other Asia Pacific	177	177												

Oil: Trade movements

Thousand barrels daily											Growth rate per annum			Share 2019
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019	2008-18	
Imports														
US	11453	11689	11338	10587	9859	9241	9451	10056	10148	9943	9094	-8.5%	-2.5%	12.8%
Europe	12602	12407	12489	12721	12920	12957	13993	14354	14700	14896	14867	-0.2%	0.6%	21.0%
China	5100	5886	6295	6675	6978	7398	8333	9214	10241	11024	11825	7.3%	8.4%	16.7%
India	3491	3749	3823	4168	4370	4155	4380	4945	4820	5196	5379	3.5%	5.4%	7.6%
Japan	4263	4567	4494	4743	4637	4383	4332	4180	4142	3940	3779	-4.1%	-2.2%	5.3%
Rest of World	17211	17048	17634	17812	20012	21193	22026	23776	25663	26154	25980	-0.7%	4.3%	36.6%
Total World	54320	55346	56072	56706	58776	59328	62515	66526	69814	71154	70925	-0.3%	2.3%	100.0%
Exports														
Canada	2518	2599	2798	3056	3296	3536	3836	3890	4241	4513	4683	3.8%	6.1%	6.6%
Mexico	1449	1539	1487	1366	1347	1293	1323	1380	1290	1314	1268	-3.5%	-2.0%	1.8%
US	1947	2154	2495	2682	3563	4033	4521	5078	5888	7054	8016	13.6%	13.6%	11.3%
S. & Cent. America	3748	3568	3755	3830	3790	3939	4107	4147	3958	3741	3422	-8.5%	0.3%	4.8%
Europe	2076	1966	2139	2181	2545	2467	2926	3082	3392	3419	3159	-7.6%	5.1%	4.5%
Russia	7257	7397	7448	7457	7948	7792	8313	8814	8992	9080	9186	1.2%	1.9%	13.0%
Other CIS	1861	2039	2180	1962	2166	2092	2100	2096	2201	2201	2265	2.9%	2.4%	3.2%
Saudi Arabia	7276	7595	8120	8468	8365	7911	7968	8606	8404	8638	8397	-2.8%	0.3%	11.8%
Middle East (ex Saudi Arabia)	11744	11976	12188	11742	12242	12699	13537	15321	16255	16098	15010	-6.8%	2.6%	21.2%
North Africa	2943	2878	1951	2602	2127	1743	1701	1727	2226	2410	2420	0.4%	-3.0%	3.4%
West Africa	4531	4755	4759	4724	4690	4849	4880	4401	4531	4552	4560	0.2%	-0.3%	6.4%
Asia Pacific (ex Japan)	5631	6226	6088	6299	6307	6450	6780	7356	7811	7568	7953	5.2%	-3.4%	11.2%
Rest of World	1340	653	663	338	491	524	525	625	625	665	577	2.0%	-8.6%	0.8%
Total World	54320	55346	56072	56706	58776	59328	62515	66526	69814	71154	70925	-0.3%	2.3%	100.0%

Notes: Unless otherwise stated, this table shows inter-regional trade based on the regional classification in the table 'Oil trade in 2018 and 2019'. Bunker fuel use is not included as exports. Intra-area movements (for example, between countries within Europe) are excluded. Annual changes and shares of total are calculated using thousand barrels daily figures.

Oil: Inter-area movements 2019

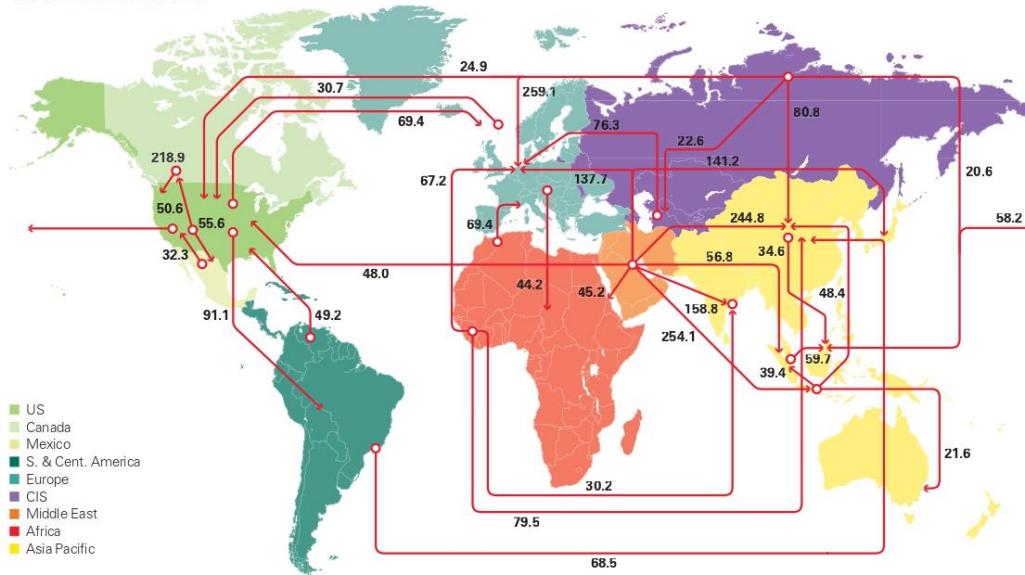
Crude (million tonnes)	To													Total		
	Canada	Mexico	S. & Cent. America	Europe	Russia	Other CIS	Middle East	Africa	Australasia	China	India	Japan	Singapore		Other Asia Pacific	
Canada	-	189.7	0.3	3.7	-	-	+	-	+	2.2	0.9	+	-	0.2	197.0	
Mexico	-	29.9	0.1	10.5	-	-	0.1	-	-	0.5	10.0	0.3	-	6.8	58.1	
US	24.2	0.1	-	8.1	45.8	-	+	2.5	0.2	6.3	9.1	3.1	1.9	36.0	137.7	
S. & Cent. America	0.2	+	40.0	12.6	-	+	0.4	0.3	-	67.2	18.7	2.3	0.5	3.9	146.2	
Europe	0.9	-	6.3	0.8	-	+	0.4	0.3	+	13.6	2.4	-	1.4	10.4	28.1	
Russia	0.9	-	6.6	0.4	153.0	-	18.4	5.6	+	0.9	77.7	2.9	7.9	1.4	104.4	
Other CIS	0.3	-	1.6	0.1	68.1	+	-	4.9	0.3	0.1	4.2	3.6	0.9	0.4	91.5	
Iraq	-	-	16.5	0.6	55.4	+	+	3.3	0.3	-	51.8	49.2	2.1	2.7	189.9	
Kuwait	-	-	2.2	-	4.9	-	-	+	3.7	-	22.7	10.6	12.6	2.7	39.8	
Saudi Arabia	5.1	-	24.9	3.5	39.9	-	-	13.2	8.4	0.3	83.3	42.6	52.6	6.1	358.4	
UAE	-	-	0.1	+	0.2	+	+	2.6	6.1	15.3	19.6	42.9	13.2	39.4	139.4	
Other Middle East	-	-	-	+	4.3	-	-	5.7	0.1	0.1	52.2	10.8	19.3	9.2	125.2	
North Africa	0.1	-	4.6	2.7	59.1	-	0.1	1.3	+	2.1	10.7	5.6	0.4	1.4	93.4	
West Africa	1.1	-	14.1	4.7	65.1	+	+	1.7	10.0	1.7	77.8	30.2	0.4	2.3	219.0	
East & S. Africa	+	+	0.2	+	+	+	+	+	+	-	3.9	0.7	0.1	+	6.5	
Australasia	+	-	-	+	+	-	-	0.6	+	-	2.3	-	0.4	3.0	6.8	
China	-	-	-	+	+	-	+	+	+	-	-	-	-	+	0.4	
India	-	-	-	+	+	-	-	+	+	-	-	-	-	+	0.1	
Japan	-	-	-	+	+	-	-	+	+	+	-	-	-	+	+	
Singapore	-	-	-	+	+	-	-	+	+	0.4	-	-	-	-	1.9	
Other Asia Pacific	+	-	1.6	+	+	-	-	0.5	0.1	10.6	15.6	4.7	1.5	4.6	39.2	
Total imports	32.9	0.1	338.4	21.3	522.5	+	18.5	40.2	26.4	22.9	507.2	221.7	146.9	49.6	290.4	2239.0
Product (million tonnes)																
Canada	-	0.6	29.2	1.0	1.7	+	+	+	+	0.9	0.1	0.8	0.1	0.4	34.7	
Mexico	+	-	2.4	1.1	0.1	-	+	+	0.1	0.2	0.2	0.2	0.7	+	4.8	
US	26.3	55.5	-	83.0	23.6	+	+	2.5	8.6	1.1	2.7	10.2	13.1	2.5	251.1	
S. & Cent. America	0.2	0.9	9.2	-	3.8	+	+	0.6	2.6	0.1	1.3	0.4	0.4	2.7	23.3	
Europe	4.8	1.5	24.4	9.6	-	0.4	1.1	13.6	43.9	1.2	2.4	0.6	0.6	16.2	125.4	
Russia	0.3	0.1	18.3	2.8	106.1	-	4.2	3.3	4.8	+	3.1	0.9	1.1	9.4	164.6	
Other CIS	0.3	+	0.6	0.1	8.2	8.8	-	0.1	0.6	+	0.4	0.1	+	0.1	12.0	
Iraq	-	-	0.4	+	+	-	+	0.4	+	-	0.1	1.4	-	6.9	11.0	
Kuwait	+	-	+	0.2	1.8	-	+	4.0	3.5	+	2.4	2.1	1.4	1.8	8.1	
Saudi Arabia	+	-	1.4	0.4	16.5	+	+	5.7	10.3	0.2	3.5	8.1	1.3	3.3	57.4	
UAE	+	+	1.1	1.0	6.7	+	+	5.4	11.2	0.7	6.6	7.9	4.5	8.9	77.0	
Other Middle East	+	+	1.2	0.2	8.1	+	0.1	13.2	5.1	0.2	6.9	6.6	4.4	1.9	143.3	
North Africa	+	-	5.0	1.4	10.3	+	+	0.7	0.4	+	1.6	0.9	0.3	0.7	47.7	
West Africa	+	+	1.3	0.6	2.1	+	+	+	0.5	+	1.7	+	+	0.2	12.7	
East & S. Africa	+	+	+	0.2	0.3	+	+	1.3	0.7	+	+	+	+	+	3.0	
Australasia	+	+	0.1	0.1	1.2	+	+	+	+	-	1.2	0.1	1.3	0.6	10.0	
China	0.3	1.3	0.5	3.7	2.5	+	0.1	1.6	2.8	3.4	-	0.8	0.8	15.0	66.9	
India	+	+	4.6	1.5	10.4	+	+	13.5	10.9	0.6	1.1	-	1.0	5.3	111.9	
Japan	0.1	0.3	1.7	1.5	0.2	+	+	0.1	0.1	4.6	2.4	0.1	-	1.4	6.9	
Singapore	0.1	0.1	1.2	1.2	1.7	+	+	1.2	3.7	9.3	7.1	1.8	0.5	-	86.1	
Other Asia Pacific	0.1	0.6	7.1	0.9	3.8	0.1	0.2	2.3	5.3	11.0	32.8	2.4	8.0	34.8	109.3	
Total imports	32.5	60.9	109.9	110.2	209.2	9.4	5.6	69.3	115.1	32.2	78.4	44.4	39.7	112.4	212.7	1241.9

† Less than 0.05.

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.

Major trade movements 2019

Trade flows worldwide (million tonnes)



Oil trade in 2018 and 2019

Million tonnes	2018				2019			
	Crude imports	Product imports	Crude exports	Product exports	Crude imports	Product imports	Crude exports	Product exports
Canada	26.6	35.7	191.5	32.0	32.9	32.5	197.0	34.7
Mexico	0.1	61.6	59.8	5.4	0.1	60.9	58.1	4.8
US	396.8	104.0	92.2	248.9	338.4	109.9	137.7	251.1
S. & Cent. America	24.4	105.9	156.9	23.2	21.3	110.2	146.2	23.3
Europe	514.4	218.4	25.7	138.9	522.5	209.2	26.7	125.4
Russia	0.5	9.4	274.7	170.4	†	9.4	286.1	164.6
Other CIS	18.6	10.0	86.8	21.9	18.5	5.6	91.5	20.4
Iraq	†	3.4	201.1	8.6	†	4.5	200.8	11.0
Kuwait	†	0.7	107.4	25.1	†	0.8	99.2	25.4
Saudi Arabia	†	10.9	367.1	60.6	0.1	11.4	358.4	57.4
United Arab Emirates	7.3	32.4	126.5	75.1	12.3	34.9	139.4	77.0
Other Middle East	24.9	16.7	191.3	59.6	27.8	17.8	125.2	62.1
North Africa	7.3	38.9	92.3	26.6	6.4	37.6	93.4	26.1
West Africa	1.0	41.7	218.9	7.5	0.4	38.5	219.0	7.7
East & S. Africa	21.5	34.4	6.3	3.0	19.6	39.0	5.5	3.0
Australasia	23.4	32.6	9.0	4.0	22.9	32.2	13.0	5.5
China	463.8	81.8	2.4	54.7	507.2	78.4	0.4	66.9
India	226.1	31.3	0.1	58.2	221.7	44.4	0.1	60.7
Japan	150.7	43.7	†	18.0	146.9	39.7	†	19.3
Singapore	51.8	120.4	0.6	88.9	49.6	112.4	1.9	86.1
Other Asia Pacific	300.0	209.0	38.9	107.2	290.4	212.7	39.2	109.3
Total World	2249.3	1242.9	2249.3	1242.9	2239.0	1241.9	2239.0	1241.9
Thousand barrels daily								
Canada	534	747	3845	668	660	679	3956	726
Mexico	3	1287	1200	114	1	1273	1167	101
US	7768	2175	1851	5203	6796	2298	2766	5250
S. & Cent. America	490	2215	3150	590	427	2303	2936	486
Europe	10330	4566	516	2904	10494	4373	537	2622
Russia	10	196	5517	3563	†	197	5746	3440
Other CIS	373	210	1743	458	372	117	1838	427
Iraq	†	71	4039	181	†	94	4032	230
Kuwait	†	15	2156	524	†	17	1992	531
Saudi Arabia	†	228	7372	1266	†	238	7198	1199
United Arab Emirates	147	677	2540	1569	248	729	2800	1610
Other Middle East	501	348	3942	1246	558	372	2514	1299
North Africa	147	812	1853	557	129	785	1875	545
West Africa	19	873	4395	157	9	806	4399	161
East & S. Africa	432	719	127	62	393	815	110	62
Australasia	469	681	162	84	459	672	262	115
China	9314	1711	48	1144	10186	1639	9	1398
India	4541	655	1	1218	4451	928	1	1268
Japan	3027	913	†	376	2950	830	†	404
Singapore	1040	2516	12	1858	997	2350	38	1799
Other Asia Pacific	6025	4368	781	2241	5833	4446	788	2286
Total World	45172	25982	45172	25982	44964	25961	44964	25961

†Less than 0.05.

‡Less than 0.5.

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

Crude imports and exports include condensates.

Natural gas

Total proved reserves

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

†Less than 0.05.

*Less than 0.05%.

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

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

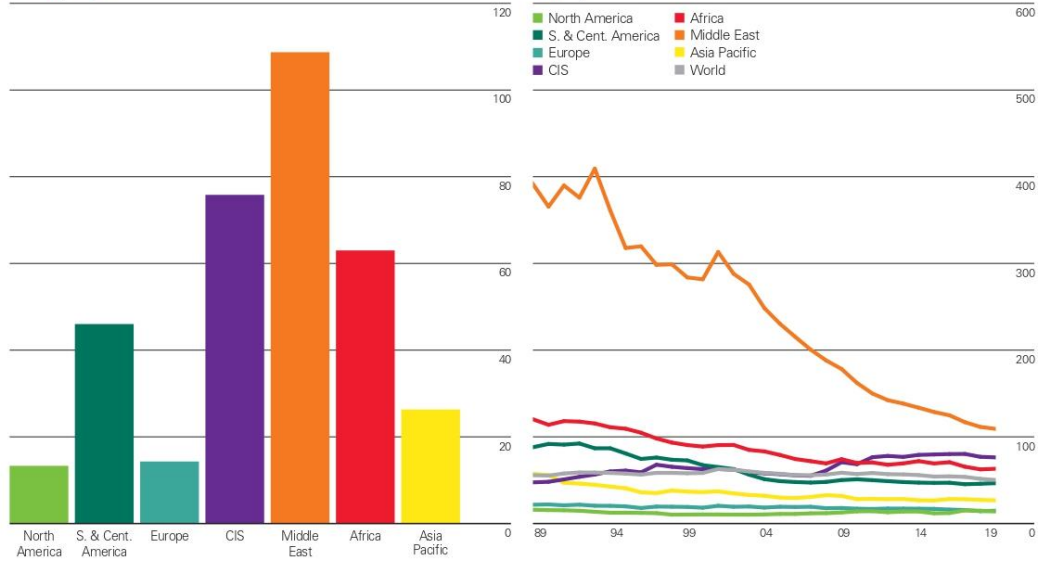
Source of data – the estimates in this table have been compiled using a combination of primary official sources and third-party data from Cedigaz and the OPEC Secretariat.

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

Reserves-to-production (R/P) ratios

Years

2019 by region

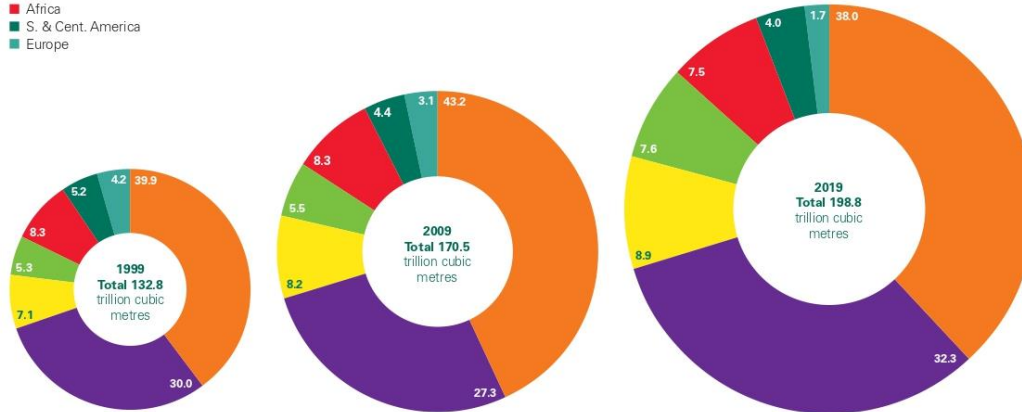


World proved gas reserves increased by 1.7 Tcm in 2019. China (2 Tcm) and Azerbaijan (0.7 Tcm) provided the largest increments, although this was partially offset by a 1.3 Tcm decline in Indonesian reserves. Russia (38 Tcm), Iran (32 Tcm) and Qatar (24.7 Tcm) are the countries with the largest reserves.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

Distribution of proved reserves in 1999, 2009 and 2019

Percentage

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



Natural gas: Production in billion cubic metres*

Billion cubic metres												Growth rate per annum			Share 2019
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019	2008-18		
Canada	155.1	149.6	151.1	150.3	151.9	159.0	160.8	171.8	175.6	179.0	173.1	-3.3%	0.7%	4.3%	
Mexico	52.6	51.2	52.1	50.9	52.5	51.3	47.9	43.7	38.3	35.2	34.0	-3.4%	-2.9%	0.9%	
US	557.6	575.2	617.4	649.1	655.7	704.7	740.3	727.4	746.2	835.9	920.9	10.2%	4.3%	23.1%	
Total North America	765.2	775.9	820.5	850.3	860.1	915.0	949.0	942.8	960.0	1050.1	1128.0	7.4%	3.3%	28.3%	
Argentina	40.3	39.0	37.7	36.7	34.6	34.5	35.5	37.3	37.1	39.4	41.6	5.6%	-0.8%	1.0%	
Bolivia	11.9	13.7	15.0	17.1	19.6	20.3	19.6	18.8	18.2	17.0	15.0	-12.2%	2.1%	0.4%	
Brazil	12.3	15.0	17.2	19.8	21.9	23.3	23.8	24.1	27.2	25.2	25.8	2.6%	5.8%	0.6%	
Colombia	10.1	10.8	10.5	11.5	13.2	12.3	11.6	12.0	12.3	12.9	13.2	2.6%	4.0%	0.3%	
Peru	3.6	7.3	11.5	12.0	12.4	13.1	12.7	14.0	13.0	12.8	13.5	5.6%	13.8%	0.3%	
Trinidad & Tobago	38.6	40.3	38.7	38.5	38.7	38.1	36.0	31.3	31.9	34.0	34.6	1.8%	-1.0%	0.9%	
Venezuela	31.8	30.5	30.2	31.9	30.6	31.8	36.1	37.2	38.6	31.6	26.5	-16.3%	-0.6%	0.7%	
Other S. & Cent. America	3.8	3.8	3.2	3.0	2.7	2.6	2.9	3.1	3.1	3.3	3.5	5.2%	-1.5%	0.1%	
Total S. & Cent. America	152.3	160.4	164.1	170.6	173.8	176.0	178.0	177.9	181.4	176.2	173.6	-1.5%	1.1%	4.4%	
Denmark	8.8	8.5	6.9	6.0	5.0	4.8	4.8	4.7	5.1	4.3	3.2	-25.4%	-8.5%	0.1%	
Germany	12.7	11.1	10.5	9.5	8.6	8.1	7.5	6.9	6.4	5.5	5.3	-3.8%	-8.6%	0.1%	
Italy	7.6	8.0	8.0	8.2	7.4	6.8	6.4	5.5	5.3	5.2	4.6	-10.9%	-5.2%	0.1%	
Netherlands	65.5	75.3	69.5	68.4	72.4	60.4	45.9	44.3	38.5	32.3	28.1	-13.0%	-7.6%	0.7%	
Norway	103.6	106.4	100.5	113.9	107.9	108.0	116.2	115.9	123.2	121.3	114.4	-5.7%	2.0%	2.9%	
Poland	4.3	4.3	4.5	4.5	4.4	4.3	4.3	4.1	4.0	4.0	4.0	0.1%	-0.7%	0.1%	
Romania	10.4	10.0	10.1	10.1	10.0	10.2	10.2	9.1	10.0	10.0	9.7	-2.8%	-0.5%	0.2%	
Ukraine	20.3	19.4	19.5	19.4	20.2	20.2	18.8	19.0	19.4	19.7	19.6	-0.5%	-0.3%	0.5%	
United Kingdom	61.2	57.9	46.1	39.2	37.0	37.4	40.7	41.7	41.9	40.5	39.6	-2.2%	-5.7%	1.0%	
Other Europe	9.3	9.3	9.2	8.4	7.2	6.3	6.1	8.7	9.0	8.5	7.4	-12.9%	-1.1%	0.2%	
Total Europe	303.7	310.4	284.8	287.5	290.0	266.6	261.0	259.9	262.8	251.2	235.9	-6.1%	-2.4%	5.9%	
Azerbaijan	15.9	16.3	16.0	16.8	17.4	18.4	18.8	18.3	17.8	19.0	24.3	27.7%	1.8%	0.6%	
Kazakhstan	19.0	20.4	20.1	19.8	21.4	21.7	22.0	22.9	23.4	23.9	23.4	-2.2%	2.7%	0.6%	
Russian Federation	536.2	598.4	616.8	601.9	614.5	591.2	584.4	589.3	635.6	669.1	679.0	1.5%	0.9%	17.0%	
Turkmenistan	33.3	40.1	56.3	59.0	59.0	63.5	65.9	63.2	58.7	61.5	63.2	2.7%	•	1.6%	
Uzbekistan	58.4	57.1	56.6	56.5	55.9	56.3	53.6	53.1	53.4	57.2	56.3	-1.6%	-0.7%	1.4%	
Other CIS	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.0%	0.2%	•	
Total CIS	663.2	732.7	766.2	754.3	768.5	751.4	745.0	747.2	789.1	831.1	846.5	1.9%	0.8%	21.2%	
Bahrain	12.1	12.4	12.6	13.1	14.0	14.7	14.8	14.4	14.5	14.6	16.9	15.4%	2.0%	0.4%	
Iran	135.7	143.9	151.0	166.9	157.5	175.5	183.5	199.3	219.5	238.3	244.2	2.4%	6.8%	6.1%	
Iraq	6.9	7.1	6.3	6.3	7.1	7.5	7.3	9.9	10.1	10.6	10.8	1.9%	5.1%	0.3%	
Kuwait	10.9	11.1	12.9	14.7	15.5	14.3	16.1	16.4	16.2	16.9	18.4	9.2%	3.4%	0.5%	
Oman	23.9	25.7	27.1	28.3	30.8	29.3	30.7	31.5	32.3	36.0	36.3	0.9%	4.1%	0.9%	
Qatar	92.4	123.1	150.4	162.5	168.2	169.5	174.9	173.6	168.6	176.5	178.1	0.9%	8.3%	4.5%	
Saudi Arabia	74.5	83.3	87.6	94.4	95.0	97.3	99.2	105.3	109.3	112.1	113.6	1.4%	3.9%	2.8%	
Syria	6.1	8.4	7.4	6.1	5.0	4.6	4.1	3.5	3.5	3.6	3.7	3.6%	-4.3%	0.1%	
United Arab Emirates	47.6	50.0	51.0	52.9	53.2	52.9	58.7	60.3	62.4	61.4	62.5	1.9%	2.3%	1.6%	
Yemen	0.8	6.3	9.4	7.6	10.4	9.8	2.9	0.5	0.6	0.6	0.6	0.8%	n/a	•	
Other Middle East	2.7	3.3	4.2	2.5	6.3	7.3	8.1	9.0	9.5	10.1	10.1	0.1%	11.3%	0.3%	
Total Middle East	413.8	474.6	520.0	545.5	562.9	582.7	600.2	623.9	646.5	680.7	695.3	2.1%	5.7%	17.4%	
Algeria	76.6	77.4	79.6	78.4	79.3	80.2	81.4	91.4	93.0	93.8	86.2	-8.1%	1.3%	2.2%	
Egypt	60.3	59.0	59.1	58.6	54.0	47.0	42.6	40.3	48.8	58.6	64.9	10.9%	0.3%	1.6%	
Libya	15.1	16.0	7.5	11.6	12.2	11.8	11.0	9.4	8.6	8.3	9.4	14.0%	-5.8%	0.2%	
Nigeria	23.2	30.9	36.4	39.2	33.1	40.0	47.6	42.6	47.2	48.3	49.3	2.1%	3.9%	1.2%	
Other Africa	16.9	19.0	19.1	19.0	19.8	19.7	21.4	22.2	26.5	27.3	28.0	2.7%	5.1%	0.7%	
Total Africa	192.1	202.3	201.7	206.8	198.3	198.7	204.0	205.9	224.2	236.2	237.9	0.7%	1.5%	6.0%	
Australia	46.7	54.0	55.7	59.5	61.8	66.6	76.0	96.4	112.8	130.1	153.5	18.0%	12.1%	3.8%	
Bangladesh	18.7	19.3	19.6	21.3	22.0	23.0	25.9	26.5	26.6	26.6	28.7	8.0%	5.0%	0.7%	
Brunei	11.1	12.0	12.5	12.3	11.9	12.7	13.3	12.9	12.9	12.6	13.0	3.3%	0.6%	0.3%	
China	85.9	96.5	106.2	111.5	121.8	131.2	135.7	137.9	149.2	161.5	177.6	9.9%	7.2%	4.5%	
India	36.1	47.4	42.9	37.3	31.1	29.4	28.1	26.6	27.7	27.5	26.9	-2.1%	-0.7%	0.7%	
Indonesia	78.0	87.0	82.7	78.3	77.6	76.4	76.2	75.1	72.7	72.8	67.5	-7.2%	-0.3%	1.7%	
Malaysia	66.2	65.1	67.0	69.3	72.6	72.2	76.8	76.7	78.5	77.3	76.8	2.0%	1.1%	2.0%	
Myanmar	11.4	12.2	12.6	12.5	12.9	16.5	19.2	18.3	17.8	17.1	17.1	-	-3.4%	0.4%	
Pakistan	34.7	35.3	35.3	36.6	35.6	35.0	35.0	34.7	34.7	34.2	33.9	-1.0%	-0.1%	0.8%	
Thailand	29.4	33.7	33.8	38.4	38.9	39.1	37.5	37.3	35.9	34.7	35.8	3.0%	1.5%	0.9%	
Vietnam	7.7	9.1	8.2	9.0	9.4	9.9	10.3	10.2	9.5	9.7	9.9	2.0%	2.9%	0.2%	
Other Asia Pacific	18.5	18.2	18.3	18.0	18.7	23.6	29.4	30.2	30.2	28.1	29.6	5.5%	4.4%	0.7%	
Total Asia Pacific	444.6	489.8	494.7	504.0	514.2	535.5	563.5	582.8	608.5	632.0	672.1	6.3%	4.0%	16.8%	
Total World	2934.9	3146.2	3251.9	3318.9	3357.8	3425.9	3500.6	3540.4	3672.5	3857.5	3989.3	3.4%	2.4%	100.0%	
of which: OECD	1094.9	1121.7	1141.9	1177.1	1184.8	1232.0	1271.5	1286.9	1323.3	1419.3	1506.2	6.1%	2.6%	37.8%	
Non-OECD	1840.0	2024.5	2110.0	2141.8	2173.1	2193.9	2229.2	2253.4	2349.2	2438.3	2483.2	1.8%	2.4%	62.2%	
European Union	178.8	183.5	163.5	153.1	150.9	137.4	124.9	124.1	119.3	109.3	101.0	-7.7%	-5.8%	2.5%	

*Excludes gas flared or recycled. Includes natural gas produced for gas-to-liquids transformation.

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

•less than 0.05%.

n/a not available.

Notes: As far as possible, the data above represents standard cubic metres (measured at 15°C and 1013 mbar); as they are derived directly from measures of energy content using an average conversion factor and have been standardized using a gross calorific value (GCV) of 40 MJ/m³, they do not necessarily equate with gas volumes expressed in specific national terms.

Annual changes and shares of total are calculated using billion cubic metres figures.

Natural gas production data expressed in billion cubic feet per day is available at [bp.com/statisticalreview](https://www.bp.com/statisticalreview).

Natural gas: Production in exajoules*

Exajoules											Growth rate per annum			Share 2019
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019	2008-18	
Canada	5.58	5.39	5.44	5.41	5.47	5.72	5.79	6.18	6.32	6.45	6.23	-3.3%	0.7%	4.3%
Mexico	1.89	1.84	1.88	1.83	1.89	1.85	1.73	1.57	1.38	1.27	1.22	-3.4%	-2.9%	0.9%
US	20.07	20.71	22.22	23.37	23.60	25.37	26.65	26.18	26.86	30.09	33.15	10.2%	4.3%	23.1%
Total North America	27.55	27.93	29.54	30.61	30.96	32.94	34.16	33.94	34.56	37.80	40.61	7.4%	3.3%	28.3%
Argentina	1.45	1.40	1.36	1.32	1.24	1.24	1.28	1.34	1.34	1.42	1.50	5.6%	-0.8%	1.0%
Bolivia	0.43	0.49	0.54	0.62	0.70	0.73	0.70	0.68	0.66	0.61	0.54	-12.2%	2.1%	0.4%
Brazil	0.44	0.54	0.62	0.71	0.79	0.84	0.86	0.87	0.98	0.91	0.93	2.6%	5.8%	0.6%
Colombia	0.36	0.39	0.38	0.41	0.48	0.44	0.42	0.43	0.44	0.46	0.47	2.6%	4.0%	0.3%
Peru	0.13	0.26	0.41	0.43	0.45	0.47	0.46	0.50	0.47	0.46	0.49	5.6%	13.8%	0.3%
Trinidad & Tobago	1.39	1.45	1.39	1.39	1.39	1.37	1.29	1.13	1.15	1.22	1.24	1.8%	-1.0%	0.9%
Venezuela	1.14	1.10	1.09	1.15	1.10	1.14	1.30	1.34	1.39	1.14	0.95	-16.3%	-0.6%	0.7%
Other S. & Cent. America	0.14	0.14	0.11	0.11	0.10	0.09	0.10	0.11	0.11	0.12	0.13	5.2%	-1.5%	0.1%
Total S. & Cent. America	5.48	5.78	5.91	6.14	6.26	6.34	6.41	6.40	6.53	6.34	6.25	-1.5%	1.1%	4.4%
Denmark	0.32	0.31	0.25	0.22	0.18	0.17	0.17	0.17	0.18	0.15	0.12	-25.4%	-8.5%	0.1%
Germany	0.46	0.40	0.38	0.34	0.31	0.29	0.27	0.25	0.23	0.20	0.19	-3.8%	-8.6%	0.1%
Italy	0.27	0.29	0.29	0.30	0.27	0.25	0.23	0.20	0.19	0.19	0.17	-10.9%	-5.2%	0.1%
Netherlands	2.36	2.71	2.50	2.46	2.61	2.17	1.65	1.59	1.39	1.16	1.01	-13.0%	-7.6%	0.7%
Norway	3.73	3.63	3.62	4.10	3.89	3.89	4.18	4.17	4.44	4.37	4.12	-5.7%	2.0%	2.9%
Poland	0.15	0.15	0.16	0.16	0.16	0.16	0.15	0.15	0.14	0.14	0.14	0.1%	-0.7%	0.1%
Romania	0.37	0.36	0.36	0.36	0.36	0.37	0.37	0.33	0.36	0.36	0.35	-2.8%	-0.5%	0.2%
Ukraine	0.73	0.70	0.70	0.70	0.73	0.73	0.68	0.68	0.70	0.71	0.71	-0.5%	-0.3%	0.5%
United Kingdom	2.20	2.08	1.66	1.41	1.33	1.35	1.46	1.50	1.51	1.46	1.43	-2.2%	-5.7%	1.0%
Other Europe	0.33	0.34	0.33	0.30	0.26	0.23	0.22	0.31	0.32	0.30	0.27	-12.9%	-1.1%	0.2%
Total Europe	10.93	11.17	10.25	10.35	10.08	9.60	9.39	9.36	9.46	9.04	8.49	-6.1%	-2.4%	5.9%
Azerbaijan	0.57	0.59	0.57	0.61	0.63	0.66	0.68	0.66	0.64	0.69	0.88	27.7%	1.8%	0.6%
Kazakhstan	0.68	0.74	0.72	0.71	0.77	0.78	0.79	0.83	0.84	0.86	0.84	-2.2%	2.7%	0.6%
Russian Federation	19.30	21.54	22.21	21.67	22.12	21.28	21.04	21.21	22.88	24.09	24.45	1.5%	0.9%	17.0%
Turkmenistan	1.20	1.44	2.03	2.12	2.12	2.29	2.37	2.28	2.11	2.21	2.27	2.7%	*	16.0%
Uzbekistan	2.10	2.06	2.04	2.03	2.01	2.03	1.93	1.91	1.92	2.06	2.03	-1.6%	-0.7%	1.4%
Other CIS	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	2.0%	0.2%	*
Total CIS	23.87	26.38	27.58	27.16	27.67	27.05	26.82	26.90	28.41	29.92	30.47	1.9%	0.8%	21.2%
Bahrain	0.44	0.45	0.45	0.47	0.50	0.53	0.53	0.52	0.52	0.53	0.61	15.4%	2.0%	0.4%
Iran	4.89	5.18	5.44	5.65	5.67	6.32	6.61	7.18	7.90	8.58	8.79	2.4%	6.8%	6.1%
Iraq	0.25	0.26	0.23	0.23	0.25	0.27	0.26	0.36	0.36	0.38	0.39	1.9%	5.1%	0.3%
Kuwait	0.39	0.40	0.46	0.53	0.56	0.51	0.58	0.59	0.58	0.61	0.66	9.2%	3.4%	0.5%
Oman	0.86	0.93	0.98	1.02	1.11	1.06	1.11	1.13	1.16	1.30	1.31	0.9%	4.1%	0.9%
Qatar	3.33	4.43	5.41	5.85	6.05	6.10	6.30	6.25	6.07	6.35	6.41	0.9%	8.3%	4.5%
Saudi Arabia	2.68	3.00	3.16	3.40	3.42	3.50	3.57	3.79	3.93	4.04	4.09	1.4%	3.9%	2.8%
Syria	0.22	0.30	0.27	0.22	0.18	0.17	0.15	0.13	0.13	0.13	0.13	3.6%	-4.3%	0.1%
United Arab Emirates	1.71	1.80	1.84	1.91	1.92	1.90	2.11	2.17	2.24	2.21	2.25	1.9%	2.3%	1.6%
Yemen	0.03	0.23	0.34	0.27	0.37	0.35	0.10	0.02	0.02	0.02	0.02	0.8%	n/a	*
Other Middle East	0.10	0.12	0.15	0.09	0.23	0.26	0.29	0.33	0.34	0.36	0.37	0.1%	11.3%	0.3%
Total Middle East	14.90	17.09	18.72	19.64	20.26	20.98	21.61	22.46	23.28	24.51	25.03	2.1%	5.7%	17.4%
Algeria	2.76	2.79	2.87	2.82	2.86	2.89	2.93	3.29	3.35	3.38	3.10	-8.1%	1.3%	2.2%
Egypt	2.17	2.12	2.13	2.11	1.94	1.69	1.53	1.45	1.76	2.11	2.34	10.9%	0.3%	1.6%
Libya	0.54	0.58	0.27	0.42	0.44	0.43	0.40	0.34	0.31	0.30	0.34	14.0%	-5.8%	0.2%
Nigeria	0.83	1.11	1.31	1.41	1.19	1.44	1.71	1.53	1.70	1.74	1.77	2.1%	3.9%	1.2%
Other Africa	0.61	0.69	0.69	0.68	0.71	0.71	0.77	0.80	0.96	0.98	1.01	2.7%	5.1%	0.7%
Total Africa	6.92	7.28	7.26	7.44	7.14	7.15	7.34	7.41	8.07	8.50	8.57	0.7%	1.5%	6.0%
Australia	1.68	1.94	2.00	2.14	2.22	2.40	2.74	3.47	4.06	4.68	5.52	18.0%	12.1%	3.8%
Bangladesh	0.67	0.69	0.70	0.77	0.79	0.83	0.93	0.95	0.96	0.96	1.03	8.0%	5.0%	0.7%
Brunei	0.40	0.43	0.45	0.44	0.43	0.46	0.48	0.47	0.46	0.45	0.47	3.3%	0.6%	0.3%
China	3.09	3.48	3.82	4.01	4.39	4.72	4.88	4.97	5.37	5.82	6.39	9.9%	7.2%	4.5%
India	1.30	1.71	1.55	1.34	1.12	1.06	1.01	0.96	1.00	0.99	0.97	-2.1%	-0.7%	0.7%
Indonesia	2.81	3.13	2.98	2.82	2.79	2.75	2.74	2.70	2.62	2.62	2.43	-7.2%	-0.3%	1.7%
Malaysia	2.38	2.34	2.41	2.49	2.61	2.60	2.77	2.76	2.82	2.78	2.84	2.0%	1.1%	2.0%
Myanmar	0.41	0.44	0.45	0.45	0.46	0.60	0.69	0.66	0.64	0.61	0.61	-	3.4%	0.4%
Pakistan	1.25	1.27	1.27	1.32	1.28	1.26	1.26	1.25	1.25	1.23	1.22	-1.0%	-0.1%	0.8%
Thailand	1.06	1.21	1.22	1.38	1.40	1.41	1.35	1.34	1.29	1.25	1.29	3.0%	1.5%	0.9%
Vietnam	0.28	0.33	0.29	0.32	0.34	0.35	0.37	0.37	0.34	0.35	0.35	2.0%	2.9%	0.2%
Other Asia Pacific	0.67	0.65	0.66	0.65	0.67	0.85	1.06	1.09	1.09	1.01	1.07	5.5%	4.4%	0.7%
Total Asia Pacific	16.01	17.63	17.81	18.14	18.51	19.28	20.28	20.98	21.90	22.75	24.20	6.3%	4.0%	16.8%
Total World	105.66	113.26	117.07	119.48	120.88	123.33	126.02	127.45	132.21	138.87	143.62	3.4%	2.4%	100.0%
of which: OECD	39.42	40.38	41.11	42.37	42.65	44.35	45.77	46.33	47.64	51.09	54.22	6.1%	2.6%	37.8%
Non-OECD	66.24	72.88	75.96	77.11	78.23	78.98	80.25	81.12	84.57	87.78	89.39	1.8%	2.4%	62.2%
European Union	6.44	6.60	5.89	5.51	5.43	4.94	4.50	4.47	4.29	3.94	3.63	-7.7%	-5.8%	2.5%

*Excludes gas flared or recycled. Includes natural gas produced for gas-to-liquids transformation.

*Less than 0.05%.

n/a not available.

Note: Annual changes and shares of total are calculated using exajoules figures.

Source: includes data from Cedizag, FGE MENAgas service.

Natural gas: Consumption in billion cubic metres*

Billion cubic metres	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Growth rate per annum		Share 2019	
											2019	2019		2008-18
Canada	86.6	88.3	97.5	97.2	104.3	109.6	109.8	106.2	109.3	118.3	120.3	1.7%	2.8%	3.1%
Mexico	65.2	66.0	70.8	73.7	77.8	78.8	80.8	83.0	86.0	87.6	90.7	3.5%	3.9%	2.3%
US	617.6	648.2	658.2	688.1	707.0	722.3	743.6	749.1	740.0	819.9	846.6	3.3%	2.7%	21.5%
Total North America	769.4	802.5	826.6	859.0	889.1	910.7	934.1	938.3	935.3	1025.8	1057.6	3.1%	2.8%	26.9%
Argentina	41.8	42.1	43.8	45.7	46.0	46.2	46.7	48.2	48.3	48.7	47.5	-2.5%	1.2%	1.2%
Brazil	20.7	27.6	27.5	32.6	38.4	40.7	42.9	37.1	37.6	35.9	35.8	-0.2%	3.4%	0.9%
Chile	2.8	5.7	5.8	5.3	5.3	4.4	4.8	5.9	5.6	6.4	6.5	1.1%	8.8%	0.2%
Colombia	8.4	8.7	8.5	9.5	10.5	11.4	11.2	12.1	12.4	13.2	13.4	1.8%	6.1%	0.3%
Ecuador	0.6	0.6	0.6	0.7	0.9	0.9	0.8	0.9	0.8	0.7	0.6	-10.6%	3.6%	•
Peru	3.3	5.4	6.3	6.9	6.7	7.4	7.6	8.5	7.5	8.0	8.3	3.7%	9.4%	0.2%
Trinidad & Tobago	19.1	20.7	20.5	20.2	20.4	20.5	19.6	16.9	18.3	17.4	17.5	1.0%	-1.0%	0.4%
Venezuela	34.2	31.3	33.3	34.6	32.3	34.0	37.0	37.2	38.6	31.6	26.5	-16.3%	-1.0%	0.7%
Other S. & Cent. America	4.9	6.1	5.8	6.3	6.9	7.2	7.1	7.3	7.2	8.0	9.2	14.7%	5.4%	0.2%
Total S. & Cent. America	135.8	147.3	152.1	161.8	167.3	172.6	177.8	174.2	176.3	169.9	165.4	-2.7%	1.9%	4.2%
Austria	8.8	9.6	9.0	8.6	8.2	7.5	8.0	8.3	9.1	8.7	8.9	2.5%	-0.4%	0.2%
Belgium	17.6	19.4	16.5	16.7	16.5	14.5	15.8	16.2	16.4	16.9	17.4	3.0%	-0.3%	0.4%
Czech Republic	7.9	9.4	7.9	8.0	8.1	7.2	7.5	8.2	8.4	8.0	8.3	-4.3%	-0.4%	0.2%
Finland	3.7	4.1	3.6	3.2	3.0	2.7	2.3	2.0	1.8	2.1	2.0	-3.8%	-6.7%	0.1%
France	44.7	49.6	43.0	44.4	45.1	37.9	40.8	44.5	44.8	42.7	43.4	1.7%	-0.8%	1.1%
Germany	84.4	88.1	80.9	81.1	85.0	73.9	77.0	84.9	87.7	85.9	88.7	3.3%	-0.4%	2.3%
Greece	3.4	3.7	4.6	4.2	3.7	2.8	3.1	4.0	4.8	4.7	5.1	9.0%	1.5%	0.1%
Hungary	10.6	11.4	10.9	9.7	9.1	8.1	8.7	9.3	9.9	9.6	9.8	2.0%	-2.4%	0.2%
Italy	74.3	79.1	74.2	71.4	66.7	59.0	64.3	67.5	71.6	69.2	70.8	2.3%	-1.5%	1.8%
Netherlands	41.4	46.8	40.9	39.3	39.1	34.5	34.1	35.2	36.2	35.4	36.8	4.2%	-1.3%	0.9%
Norway	4.1	4.1	4.0	4.0	4.0	4.3	4.5	4.4	4.6	4.5	4.5	0.2%	0.4%	0.1%
Poland	15.1	16.2	16.5	17.4	17.4	17.0	17.1	18.3	19.2	19.9	20.4	2.3%	2.4%	0.5%
Portugal	4.8	5.2	5.3	4.6	4.3	4.1	4.8	5.1	6.3	5.8	6.1	5.7%	1.9%	0.2%
Romania	12.3	12.5	12.9	12.5	11.4	10.9	10.4	10.5	11.3	11.6	10.9	-5.9%	-2.0%	0.3%
Spain	36.3	36.2	33.6	33.2	30.3	27.5	28.5	29.1	31.7	31.5	36.1	14.8%	-2.5%	0.9%
Sweden	1.1	1.5	1.2	1.1	1.0	0.8	0.9	1.0	1.0	1.0	1.0	2.2%	1.7%	•
Switzerland	3.1	3.5	3.1	3.4	3.6	3.1	3.3	3.5	3.5	3.3	3.4	2.4%	0.2%	0.1%
Turkey	33.7	35.8	41.8	43.3	44.0	46.6	46.0	44.5	51.6	47.2	43.2	-8.5%	3.0%	1.1%
Ukraine	48.9	54.6	56.1	51.8	47.7	40.3	32.0	31.4	30.2	30.6	28.2	-7.7%	-6.9%	0.7%
United Kingdom	91.2	98.5	81.9	76.9	76.3	70.1	72.0	80.7	78.6	79.3	78.8	-0.5%	-2.1%	2.0%
Other Europe	29.8	33.5	32.3	30.7	29.7	27.2	28.1	28.9	30.3	30.2	30.1	-0.4%	-1.2%	0.8%
Total Europe	577.4	622.9	580.4	565.7	554.4	500.0	509.2	537.4	558.9	548.0	554.8	1.1%	-1.3%	14.1%
Azerbaijan	8.6	8.1	8.9	9.4	9.4	9.9	11.1	10.9	10.6	10.8	11.8	9.0%	0.8%	0.3%
Belarus	16.9	20.7	19.2	19.4	19.3	19.1	17.9	17.8	19.2	19.3	19.3	3.3%	-0.3%	0.5%
Kazakhstan	10.1	11.0	12.2	13.0	13.6	15.0	15.3	15.8	16.8	19.0	17.9	12.8%	6.0%	0.5%
Russian Federation	397.8	423.9	435.6	428.6	424.9	422.2	408.7	420.6	414.1	454.5	444.3	-2.2%	1.7%	11.3%
Turkmenistan	17.1	18.3	20.7	22.9	19.3	20.0	25.4	25.1	24.8	28.4	31.5	11.1%	13.7%	0.8%
Uzbekistan	44.1	44.0	47.4	46.2	46.2	48.5	46.3	43.3	43.1	44.4	43.4	-2.2%	0.1%	1.1%
Other CIS	5.3	5.2	5.5	5.7	4.8	5.3	5.2	5.1	5.1	5.9	5.5	-6.0%	-0.1%	0.1%
Total CIS	499.9	531.3	549.5	545.2	537.3	539.9	530.0	538.8	549.6	582.3	573.7	-1.5%	1.1%	14.6%
Iran	134.8	144.4	153.2	152.5	153.8	173.4	184.0	196.3	209.1	224.1	223.6	-0.2%	5.9%	5.7%
Iraq	6.9	7.1	6.3	6.3	7.1	7.5	7.3	9.9	11.4	14.6	19.9	36.5%	8.5%	0.5%
Israel	4.0	5.1	4.7	2.4	6.6	7.2	8.1	9.2	9.9	10.5	10.8	2.4%	11.3%	0.3%
Kuwait	11.8	14.0	15.9	17.5	17.8	17.9	20.3	21.1	21.0	21.2	23.5	11.2%	5.8%	0.6%
Oman	13.7	16.3	18.1	19.7	21.7	21.3	23.0	22.8	23.3	25.0	25.0	0.1%	6.5%	0.6%
Qatar	21.3	25.4	28.7	33.6	35.5	38.5	42.4	40.2	39.9	41.4	41.1	-0.7%	7.2%	1.0%
Saudi Arabia	74.5	83.3	87.6	94.4	95.0	97.3	99.2	105.3	109.3	112.1	113.6	1.4%	3.9%	2.9%
United Arab Emirates	57.6	59.3	61.6	63.9	64.7	63.4	71.5	72.7	74.7	74.4	76.0	2.2%	2.5%	1.9%
Other Middle East	22.7	25.2	21.9	20.4	21.0	20.9	22.4	23.0	23.5	22.6	24.8	9.9%	0.9%	0.6%
Total Middle East	347.3	380.1	398.1	410.8	423.3	447.5	478.3	500.7	522.2	545.8	554.4	2.3%	4.9%	14.2%
Algeria	26.2	25.3	26.8	29.9	32.1	36.1	37.9	38.6	39.5	43.4	45.2	4.2%	5.9%	1.2%
Egypt	40.9	43.4	47.8	50.6	49.5	46.2	46.0	49.4	55.9	59.6	58.9	-1.1%	4.2%	1.5%
Nigeria	0.6	0.7	0.9	1.2	1.1	1.1	1.1	1.1	1.1	1.0	1.0	-5.2%	5.8%	•
South Africa	3.3	4.1	4.3	4.4	4.1	4.3	4.3	4.5	4.4	4.5	4.3	-4.2%	1.3%	0.1%
Other Africa	24.5	25.4	27.5	29.1	29.8	32.2	39.1	38.4	39.1	40.3	40.7	0.9%	4.3%	1.0%
Total Africa	95.6	98.9	107.2	115.1	116.6	119.9	128.5	132.0	140.1	148.8	150.1	0.9%	4.6%	3.8%
Australia	29.1	33.8	35.3	35.4	37.2	40.1	42.1	41.7	41.2	41.4	53.7	29.7%	3.8%	1.4%
Bangladesh	18.7	19.3	19.6	21.3	22.0	23.0	25.9	26.5	26.6	27.4	34.4	25.3%	5.3%	0.9%
China	90.2	108.9	135.2	150.9	171.9	188.4	194.7	209.4	240.4	283.0	307.3	8.6%	13.2%	7.8%
China Hong Kong SAR	2.9	3.6	2.9	2.6	2.5	2.4	3.0	3.1	3.1	3.0	3.1	3.3%	0.1%	0.1%
India	49.1	58.0	60.3	55.7	49.0	48.5	47.8	50.8	53.7	58.1	59.7	2.7%	3.8%	1.5%
Indonesia	42.1	44.0	42.7	43.0	44.5	44.0	45.8	44.6	43.2	44.5	43.8	-1.6%	1.2%	1.1%
Japan	92.5	99.9	112.0	123.2	123.5	124.8	118.7	116.4	117.0	115.7	108.1	-6.6%	1.6%	2.8%
Malaysia	40.0	38.0	38.3	42.0	44.6	44.7	46.8	45.0	45.0	41.0	42.3	3.1%	-0.6%	1.1%
New Zealand	4.0	4.4	4.0	4.5	4.7	5.2	4.9	4.8	4.9	4.4	4.8	8.9%	1.2%	0.1%
Pakistan	34.7	35.3	35.3	36.6	35.6	35.0	36.5	38.7	40.7	43.6	45.7	4.8%	2.3%	1.2%
Philippines	3.7	3.5	3.8	3.6	3.4	3.5	3.3	3.8	3.8	4.1	4.1	-0.2%	1.0%	0.1%
Singapore	9.2	8.3	8.3	8.9	10.0	10.4	11.8	11.9	12.3	12.3	12.7	3.7%	3.5%	0.3%
South Korea	35.5	45.0	48.4	52.5	55.0	50.0	45.6	47.6	49.8	57.8	56.0	-3.2%	4.5%	1.4%
Sri Lanka	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	n/a
Taiwan	12.5	15.5	17.0	17.9	17.9	18.9	20.2	21.0	23.2	23.7	23.3	-1.7%	6.4%	0.6%
Thailand	38.1	43.2	44.3	48.6	48.9	49.9	51.0	50.6	50.1	50.0	50.8	1.6%	3.1%	1.3%
Vietnam	7.7	9.1	8.2	9.0	9.4	9.9	10.3	10.2	9.5	9.7	9.9	2.0%	2.9%	0.3%
Other Asia Pacific	5.5	6.8	7.5	8.5	8.6	10.1	12.0	11.4	11.4	11.3	10.3	-8.9%	5.9%	0.3%
Total Asia Pacific	515.6	577.7	623.2	664.4	688.6	708.8	720.2	737.5	776.1	831.0	869.9	4.7%	5.1%	22.1%
Total World	2941.1	3160.7	3237.1	3322.0	3376.6	3399.4	3478.0	3550.0	3658.6	3851.7	3929.2	2.0%	2.5%	100.0%
of which: OECD	1445.3	1542.9	1537.9	1573.9	1606.9	1581.9	1615.1	1649.1	1689.5	1756.5	1801.1	2.5%	1.6%	45.8%
Non-OECD	1495.8	1617.7	1699.2	1748.1	1769.7	1817.5	1862.9	1900.9	1969.0	2095.1	2128.2	1.6%	3.3%	54.2%
European Union	484.5	521.3	471.0	459.1	450.8	401.4	418.7	448.8	463.8	457.2	469.6	2.7%	-1.2%	12.0%

Source: includes data from Cedigaz, FGE MENAgas service.

*Excludes natural gas converted to liquid fuels but includes derivatives of coal as well as natural gas consumed in gas-to-liquids transformation.
•less than 0.05%
n/a not available.

Notes: As far as possible, the data above represents standard cubic metres (measured at 15°C and 1013 mbar), as they are derived directly from measures of energy content using an average conversion factor and have been standardized using a gross calorific value (GCV) of 40 MJ/m³; they do not necessarily equate with gas volumes expressed in specific national terms. The difference between these world consumption figures and the world production statistics is due to variations in stocks at storage facilities and liquefaction plants, together with unavoidable disparities in the definition, measurement or conversion of gas supply and demand data.

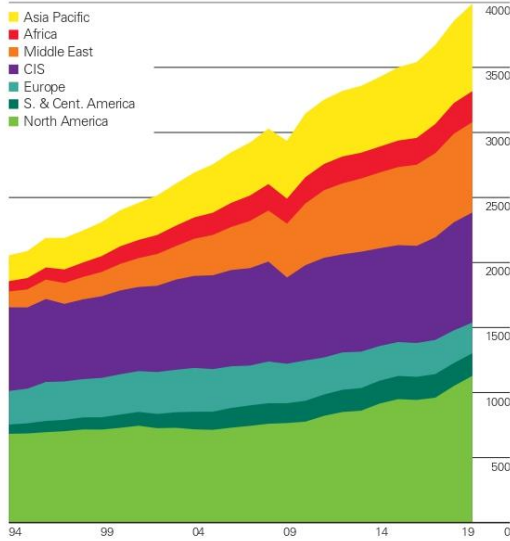
Annual changes and shares of total are calculated using billion cubic metres figures.
Natural gas consumption data

Natural gas: Consumption in exajoules*

Exajoules	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Growth rate per annum			Share 2019
											2019	2019	2008-18	
Canada	3.12	3.18	3.51	3.50	3.75	3.95	3.95	3.82	3.94	4.26	4.33	1.7%	2.8%	3.1%
Mexico	2.35	2.38	2.55	2.65	2.80	2.84	2.91	2.99	3.10	3.15	3.26	3.5%	3.9%	2.3%
US	22.23	23.33	23.70	24.77	25.45	26.00	26.77	26.97	26.64	29.52	30.48	3.3%	2.7%	21.5%
Total North America	27.70	28.89	29.76	30.92	32.01	32.79	33.63	33.78	33.67	36.93	38.07	3.1%	2.8%	26.9%
Argentina	1.51	1.52	1.58	1.64	1.66	1.66	1.68	1.74	1.74	1.75	1.71	-2.5%	1.2%	1.2%
Brazil	0.74	0.99	0.99	1.17	1.38	1.46	1.55	1.34	1.35	1.29	1.29	-0.2%	3.4%	0.9%
Chile	0.10	0.21	0.21	0.19	0.19	0.16	0.17	0.21	0.20	0.23	0.23	1.1%	8.8%	0.2%
Colombia	0.30	0.31	0.31	0.34	0.38	0.41	0.40	0.44	0.45	0.48	0.48	1.8%	6.1%	0.3%
Ecuador	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	-10.6%	3.6%	♦
Peru	0.12	0.20	0.23	0.25	0.24	0.27	0.28	0.31	0.27	0.29	0.30	3.7%	9.4%	0.2%
Trinidad & Tobago	0.69	0.75	0.74	0.73	0.73	0.74	0.71	0.61	0.66	0.63	0.63	1.0%	-1.0%	0.4%
Venezuela	1.23	1.13	1.20	1.25	1.16	1.22	1.33	1.34	1.39	1.14	0.95	-16.3%	-1.0%	0.7%
Other S. & Cent. America	0.18	0.18	0.21	0.23	0.25	0.26	0.26	0.26	0.26	0.29	0.33	14.7%	5.4%	0.2%
Total S. & Cent. America	4.89	5.30	5.48	5.82	6.02	6.21	6.40	6.27	6.35	6.12	5.95	-2.7%	1.9%	4.2%
Austria	0.32	0.35	0.33	0.31	0.30	0.27	0.29	0.30	0.33	0.31	0.32	2.5%	-0.4%	0.2%
Belgium	0.63	0.70	0.59	0.60	0.60	0.52	0.57	0.58	0.59	0.61	0.63	3.0%	-0.3%	0.4%
Czech Republic	0.28	0.34	0.29	0.29	0.29	0.26	0.27	0.29	0.30	0.29	0.30	4.3%	-0.4%	0.2%
Finland	0.13	0.15	0.13	0.12	0.11	0.10	0.08	0.07	0.07	0.08	0.07	-3.8%	-6.7%	0.1%
France	1.61	1.78	1.55	1.60	1.63	1.36	1.47	1.60	1.61	1.54	1.56	1.7%	-0.8%	1.1%
Germany	3.04	3.17	2.91	2.92	3.06	2.66	2.77	3.06	3.16	3.09	3.19	3.3%	-0.4%	2.3%
Greece	0.12	0.13	0.17	0.15	0.13	0.10	0.11	0.14	0.17	0.17	0.19	9.0%	1.5%	0.1%
Hungary	0.38	0.41	0.39	0.35	0.33	0.29	0.31	0.34	0.36	0.35	0.35	2.0%	-2.4%	0.2%
Italy	2.68	2.95	2.67	2.57	2.40	2.12	2.32	2.43	2.58	2.49	2.55	4.3%	-1.5%	1.1%
Netherlands	1.49	1.68	1.47	1.41	1.41	1.24	1.23	1.27	1.30	1.27	1.33	12.2%	-1.3%	0.9%
Norway	0.15	0.15	0.14	0.14	0.14	0.15	0.16	0.16	0.17	0.16	0.16	0.2%	0.4%	0.1%
Poland	0.54	0.58	0.59	0.63	0.63	0.61	0.62	0.66	0.69	0.72	0.73	2.3%	2.4%	0.5%
Portugal	0.17	0.19	0.19	0.16	0.16	0.15	0.17	0.18	0.23	0.21	0.22	5.7%	1.9%	0.2%
Romania	0.44	0.45	0.46	0.45	0.41	0.39	0.37	0.38	0.41	0.42	0.39	-5.9%	-2.0%	0.3%
Spain	1.31	1.30	1.21	1.20	1.09	0.99	1.03	1.05	1.14	1.13	1.30	14.8%	-2.5%	0.9%
Sweden	0.04	0.06	0.04	0.04	0.04	0.03	0.03	0.04	0.03	0.04	0.04	♦	♦	♦
Switzerland	0.11	0.13	0.11	0.12	0.13	0.11	0.12	0.13	0.13	0.12	0.12	2.4%	0.2%	0.1%
Turkey	1.21	1.29	1.51	1.56	1.58	1.68	1.65	1.60	1.86	1.70	1.56	-8.5%	3.0%	1.1%
Ukraine	1.76	1.96	2.02	1.87	1.72	1.45	1.15	1.13	1.09	1.10	1.02	-7.7%	-6.9%	0.7%
United Kingdom	3.28	3.55	2.95	2.77	2.75	2.52	2.59	2.90	2.83	2.85	2.84	-0.5%	-2.1%	2.0%
Other Europe	1.07	1.21	1.16	1.11	1.07	0.98	1.01	1.04	1.09	1.09	1.08	-0.4%	-1.2%	0.8%
Total Europe	20.79	22.43	20.89	20.37	19.96	18.00	18.33	19.35	20.12	19.73	19.95	1.1%	-1.3%	14.1%
Azerbaijan	0.31	0.29	0.32	0.34	0.34	0.35	0.40	0.39	0.38	0.39	0.42	9.0%	0.8%	0.3%
Belarus	0.61	0.75	0.69	0.70	0.69	0.69	0.64	0.64	0.66	0.70	0.69	-0.3%	-0.3%	0.5%
Kazakhstan	0.37	0.40	0.44	0.47	0.49	0.54	0.55	0.57	0.60	0.68	0.64	5.8%	6.0%	0.5%
Russian Federation	14.32	15.26	15.68	15.43	15.30	15.20	14.71	15.14	15.52	16.36	16.00	-2.2%	0.7%	11.3%
Turkmenistan	0.62	0.66	0.75	0.83	0.70	0.72	0.91	0.90	0.89	1.02	1.14	11.1%	13.7%	0.8%
Uzbekistan	1.59	1.59	1.70	1.66	1.66	1.75	1.67	1.56	1.55	1.60	1.56	-2.2%	0.1%	1.1%
Other CIS	0.19	0.19	0.20	0.21	0.17	0.19	0.19	0.19	0.18	0.21	0.20	-6.0%	-0.1%	0.1%
Total CIS	18.00	19.13	19.78	19.63	19.34	19.44	19.08	19.40	19.79	20.96	20.65	-1.5%	1.1%	14.6%
Iran	4.85	5.20	5.51	5.49	5.54	6.24	6.62	7.07	7.53	8.07	8.05	-0.2%	5.9%	5.7%
Iraq	0.25	0.26	0.23	0.23	0.25	0.27	0.26	0.36	0.41	0.53	0.72	36.5%	8.5%	0.5%
Israel	0.14	0.18	0.17	0.09	0.24	0.26	0.29	0.33	0.36	0.38	0.39	2.4%	11.3%	0.3%
Kuwait	0.43	0.50	0.57	0.63	0.64	0.64	0.73	0.76	0.76	0.76	0.85	11.2%	5.8%	0.6%
Oman	0.49	0.59	0.65	0.71	0.78	0.77	0.83	0.82	0.84	0.90	0.90	0.1%	6.5%	0.0%
Qatar	0.77	0.91	1.03	1.21	1.28	1.39	1.53	1.45	1.44	1.49	1.48	-0.7%	7.2%	1.0%
Saudi Arabia	2.68	3.00	3.16	3.40	3.42	3.50	3.57	3.79	3.93	4.04	4.09	1.4%	3.9%	2.9%
United Arab Emirates	2.07	2.13	2.22	2.30	2.33	2.28	2.58	2.62	2.69	2.69	2.74	2.2%	2.5%	1.9%
Other Middle East	0.82	0.91	0.79	0.73	0.76	0.75	0.81	0.83	0.85	0.81	0.89	9.9%	0.9%	0.6%
Total Middle East	12.50	13.68	14.33	14.79	15.24	16.11	17.22	18.03	18.80	19.65	20.10	2.3%	4.9%	14.2%
Algeria	0.94	0.91	0.96	1.08	1.16	1.30	1.37	1.39	1.42	1.56	1.63	4.2%	5.9%	1.2%
Egypt	1.47	1.56	1.72	1.92	1.78	1.66	1.66	1.78	2.01	2.15	2.12	-1.1%	4.2%	1.5%
Morocco	0.02	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	-5.2%	5.8%	♦
South Africa	0.12	0.15	0.15	0.16	0.15	0.15	0.16	0.16	0.16	0.16	0.15	-4.2%	1.3%	0.1%
Other Africa	0.88	0.91	0.99	1.05	1.07	1.16	1.41	1.38	1.41	1.45	1.46	0.9%	4.3%	1.0%
Total Africa	3.44	3.56	3.86	4.14	4.20	4.32	4.62	4.75	5.04	5.36	5.40	0.9%	4.6%	3.8%
Australia	1.05	1.22	1.27	1.27	1.34	1.44	1.52	1.50	1.48	1.49	1.93	29.7%	3.8%	1.4%
Bangladesh	0.67	0.69	0.70	0.77	0.79	0.83	0.93	0.95	0.96	0.99	1.24	25.3%	5.3%	0.9%
China	3.25	3.92	4.87	5.43	6.19	6.78	7.01	7.54	8.66	10.19	11.06	8.6%	13.2%	7.8%
China Hong Kong SAR	0.10	0.13	0.10	0.09	0.09	0.09	0.11	0.11	0.11	0.11	0.11	3.3%	0.1%	0.1%
India	1.77	2.12	2.17	2.01	1.76	1.75	1.72	1.83	1.93	2.09	2.15	2.7%	3.8%	1.5%
Indonesia	1.52	1.59	1.54	1.55	1.60	1.59	1.65	1.61	1.56	1.60	1.58	-1.6%	1.2%	1.1%
Japan	3.33	3.60	4.03	4.44	4.45	4.49	4.27	4.19	4.21	4.17	3.89	-6.6%	1.6%	2.8%
Malaysia	1.44	1.37	1.38	1.51	1.60	1.61	1.69	1.62	1.62	1.48	1.52	3.1%	-0.6%	1.1%
New Zealand	0.14	0.16	0.14	0.16	0.17	0.19	0.18	0.17	0.18	0.16	0.17	8.9%	1.2%	0.1%
Pakistan	1.25	1.27	1.27	1.32	1.28	1.26	1.32	1.39	1.47	1.57	1.64	4.8%	2.3%	1.2%
Philippines	0.13	0.13	0.14	0.13	0.12	0.13	0.12	0.14	0.14	0.15	0.15	-0.2%	1.0%	0.1%
Singapore	0.33	0.30	0.30	0.32	0.35	0.37	0.42	0.43	0.44	0.44	0.46	3.7%	3.5%	0.3%
South Korea	1.28	1.62	1.74	1.89	1.98	1.80	1.64	1.72	1.79	2.08	2.01	-3.2%	4.5%	1.4%
Sri Lanka	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	n/a
Taiwan	0.45	0.56	0.61	0.64	0.65	0.68	0.73	0.75	0.84	0.85	0.84	-1.7%	6.4%	0.6%
Thailand														

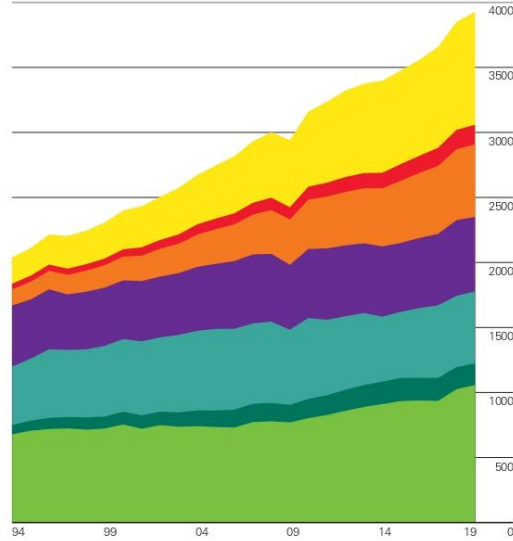
Natural gas: Production by region

Billion cubic metres



Natural gas: Consumption by region

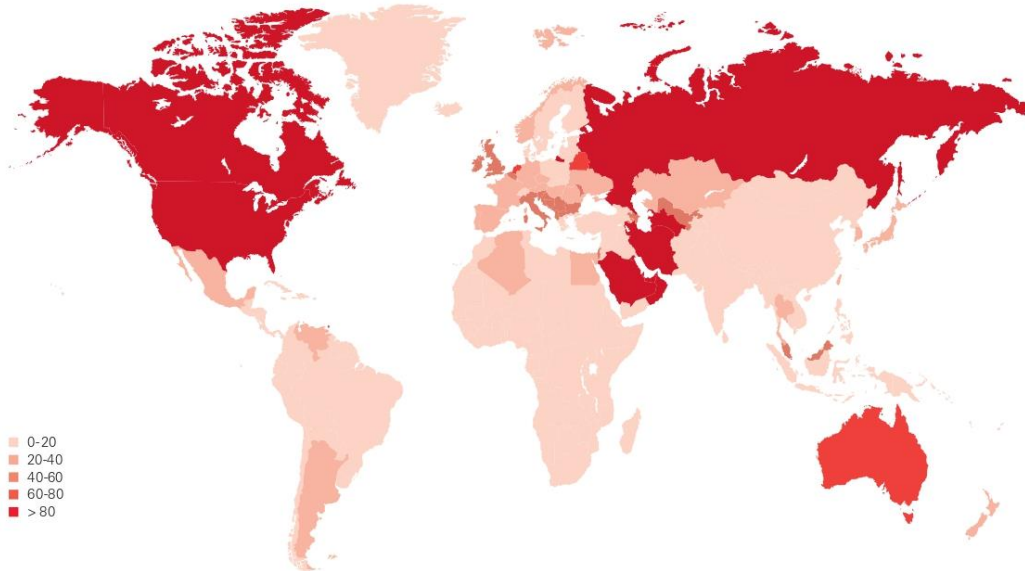
Billion cubic metres



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

Natural gas: Consumption per capita 2019

GJ per capita



Prices

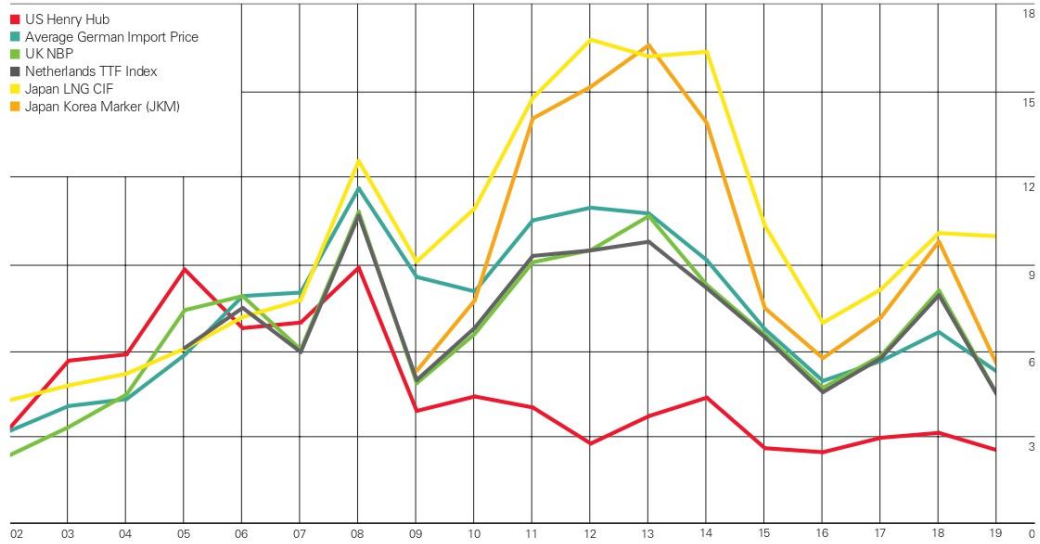
US dollars per million Btu	LNG		Natural gas					Crude oil OECD countries CIF ⁶
	Japan CIF ¹	Japan Korea Marker (JKM) ²	Average German Import Price ³	UK (Heren NBP Index) ⁴	Netherlands TTF (DA Heren Index) ⁴	US Henry Hub ⁵	Canada (Alberta) ⁶	
1989	3.28	-	2.00	-	-	1.70	-	3.01
1990	3.64	-	2.78	-	-	1.64	1.05	3.82
1991	3.99	-	3.23	-	-	1.49	0.89	3.33
1992	3.62	-	2.70	-	-	1.77	0.98	3.19
1993	3.52	-	2.51	-	-	2.12	1.69	2.82
1994	3.18	-	2.35	-	-	1.92	1.45	2.70
1995	3.46	-	2.43	-	-	1.69	0.89	2.96
1996	3.66	-	2.50	1.87	-	2.76	1.12	3.54
1997	3.91	-	2.66	1.96	-	2.53	1.36	3.29
1998	3.05	-	2.33	1.86	-	2.08	1.42	2.16
1999	3.14	-	1.86	1.58	-	2.27	2.00	2.98
2000	4.72	-	2.91	2.71	-	4.23	3.75	4.83
2001	4.64	-	3.67	3.17	-	4.07	3.61	4.08
2002	4.27	-	3.21	2.37	-	3.33	2.57	4.17
2003	4.77	-	4.06	3.33	-	5.63	4.83	4.89
2004	5.18	-	4.30	4.46	-	5.85	5.03	6.27
2005	6.05	-	5.83	7.38	6.07	8.79	7.25	8.74
2006	7.14	-	7.87	7.87	7.46	6.76	5.83	10.66
2007	7.73	-	7.99	6.01	5.93	6.95	6.17	11.95
2008	12.55	-	11.60	10.79	10.66	8.85	7.99	16.76
2009	9.06	5.28	8.53	4.85	4.96	3.89	3.38	10.41
2010	10.91	7.72	8.03	6.56	6.77	4.39	3.69	13.47
2011	14.73	14.02	10.49	9.04	9.26	4.01	3.47	18.55
2012	16.75	15.12	10.93	9.46	9.45	2.76	2.27	18.82
2013	16.17	16.56	10.73	10.64	9.75	3.71	2.93	18.25
2014	16.33	13.86	9.11	8.25	8.14	4.35	3.87	16.80
2015	10.31	7.45	6.72	6.53	6.44	2.60	2.01	8.77
2016	6.94	5.72	4.93	4.69	4.54	2.46	1.55	7.04
2017	8.10	7.13	5.62	5.80	5.72	2.96	1.60	8.97
2018	10.05	9.76	6.62	8.06	7.90	3.13	1.12	11.68
2019	9.94	5.49	5.25	4.47	4.45	2.53	1.27	10.82

¹Source: EDMC Energy Trend.
²Source: S&P Global Platts ©2020, S&P Global Inc.
³Source: 1986-1990 German Federal Statistical Office, 1991-2019 German Federal Office of Economics and Export Control (BAFA).
⁴Source: ICIS Heren Energy Ltd.
⁵Source: Energy Intelligence Group, *Natural Gas Week*.
⁶Source: ©OECD/IEA 2020, Oil, Gas, Coal and Electricity, Quarterly Statistics www.iea.org/statistics.

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

Prices

\$/mmBtu



Natural gas: Inter-regional trade

Billion cubic metres	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Growth rate per annum		
												2019	2008-18	Share 2019
US														
Pipeline imports	89.9	90.2	85.0	80.8	75.9	71.9	71.6	79.5	80.8	76.6	73.3	-4.4%	-2.5%	7.4%
LNG imports	12.6	12.1	9.9	4.9	2.7	1.7	2.5	2.4	2.2	2.1	1.5	-30.9%	-14.2%	0.1%
Total imports	102.5	102.3	94.9	85.6	78.6	73.5	74.1	82.0	83.0	78.8	74.8	-5.1%	-3.2%	7.6%
Pipeline exports	28.3	29.2	39.1	45.3	42.5	40.4	47.2	58.7	66.1	67.8	75.4	11.3%	10.4%	7.7%
LNG exports*	0.8	1.5	1.8	0.8	0.2	0.4	0.7	4.0	17.1	28.6	47.5	66.3%	39.7%	4.8%
Total exports	29.1	30.7	40.9	46.1	42.7	40.8	47.9	62.7	83.2	96.3	122.9	27.6%	13.9%	12.5%
Other North America														
Pipeline imports	28.3	29.2	39.1	45.3	42.5	40.4	47.2	58.7	66.1	67.8	75.4	11.3%	10.4%	7.7%
LNG imports	4.7	8.1	7.0	6.5	8.8	9.8	7.4	5.9	7.0	7.5	7.1	-5.1%	7.1%	0.7%
Total imports	33.1	37.3	46.1	51.7	51.3	50.2	54.7	64.5	73.1	75.2	82.5	9.7%	10.0%	8.4%
Pipeline exports	89.9	90.2	85.0	80.8	75.9	71.9	71.6	79.5	80.8	76.6	73.3	-4.4%	-2.5%	7.4%
LNG exports*	-	-	0.1	-	-	†	†	†	†	0.1	†	-77.2%	n/a	•
Total exports	89.9	90.2	85.1	80.8	75.9	71.9	71.6	79.6	80.8	76.7	73.3	-4.4%	-2.5%	7.4%
Brazil														
Pipeline imports	7.7	9.3	9.3	9.5	11.0	11.4	11.2	9.8	8.4	7.6	6.4	-15.8%	-3.3%	0.7%
LNG imports	0.4	2.8	0.7	3.5	5.2	7.1	6.8	2.6	1.7	2.9	3.2	12.2%	n/a	0.3%
Total imports	8.1	12.1	9.9	13.0	16.3	18.5	18.0	12.4	10.1	10.5	9.7	-8.2%	-0.2%	1.0%
Pipeline exports	-	-	-	0.5	0.1	0.2	†	0.6	0.2	0.1	-	-100.0%	n/a	-
LNG exports*	-	-	-	0.5	0.1	0.2	†	0.6	0.2	0.1	-	-100.0%	n/a	-
Total exports	-	-	-	0.5	0.1	0.2	†	0.6	0.2	0.1	-	-100.0%	n/a	-
Other S. & Cent. America														
LNG imports	3.1	6.4	9.3	11.1	12.9	12.5	12.1	12.6	11.7	11.6	9.9	-14.9%	20.7%	1.0%
Total imports	3.1	6.4	9.3	11.1	12.9	12.5	12.1	12.6	11.7	11.6	9.9	-14.9%	20.7%	1.0%
Pipeline exports	7.7	9.3	9.3	9.5	11.0	11.4	11.2	9.8	8.4	7.6	6.4	-15.8%	-3.3%	0.7%
LNG exports*	19.5	21.4	23.4	23.4	24.1	23.3	21.4	19.9	19.1	21.4	22.3	4.4%	1.6%	2.3%
Total exports	27.1	30.7	32.7	32.9	35.1	34.7	32.6	29.7	27.5	29.0	28.7	-0.9%	•	2.9%
Europe														
Pipeline imports	218.3	224.8	234.4	228.5	234.1	209.4	214.9	230.6	247.2	246.2	233.5	-5.2%	-1.1%	23.7%
LNG imports	70.5	89.1	89.2	68.2	51.8	52.1	56.0	56.4	64.7	71.3	119.8	68.1%	2.2%	12.2%
Total imports	288.8	313.9	323.6	296.7	285.8	261.4	270.9	287.0	311.9	317.5	353.3	11.3%	-0.5%	35.9%
Pipeline exports	3.4	5.1	6.1	8.1	9.0	13.0	11.0	10.6	8.0	11.8	8.6	-26.7%	16.5%	0.9%
LNG exports*	3.4	5.1	6.1	8.1	9.0	13.0	11.0	10.6	8.0	11.8	8.6	-26.7%	16.5%	0.9%
Total exports	3.4	5.1	6.1	8.1	9.0	13.0	11.0	10.6	8.0	11.8	8.6	-26.7%	16.5%	0.9%
Russia														
Pipeline imports	38.5	33.4	41.2	39.7	32.9	33.1	26.5	24.3	28.6	23.5	26.8	14.2%	-10.9%	2.7%
Total imports	38.5	33.4	41.2	39.7	32.9	33.1	26.5	24.3	28.6	23.5	26.8	14.2%	-10.9%	2.7%
Pipeline exports	189.6	194.0	210.6	201.5	210.7	189.6	194.2	202.0	219.7	221.3	217.2	-1.8%	-1.3%	22.1%
LNG exports*	6.8	13.5	14.3	14.3	14.5	13.6	14.6	14.6	15.4	24.9	39.4	57.9%	n/a	4.0%
Total exports	196.5	207.5	224.9	215.8	225.2	203.2	208.8	216.7	235.2	246.2	256.6	4.2%	-0.2%	26.1%
Other CIS														
Pipeline imports	22.7	26.5	25.4	25.2	24.0	26.3	25.4	26.3	28.8	30.3	29.2	-3.5%	1.8%	3.0%
Total imports	22.7	26.5	25.4	25.2	24.0	26.3	25.4	26.3	28.8	30.3	29.2	-3.5%	1.8%	3.0%
Pipeline exports	51.5	51.1	71.8	69.7	69.5	75.4	72.6	72.8	78.0	79.7	81.3	2.0%	-0.3%	8.3%
Total exports	51.5	51.1	71.8	69.7	69.5	75.4	72.6	72.8	78.0	79.7	81.3	2.0%	-0.3%	8.3%
Middle East														
Pipeline imports	9.1	13.4	13.0	5.3	6.3	7.6	9.6	7.3	4.6	2.2	1.8	-18.6%	-14.7%	0.2%
LNG imports	0.9	3.0	4.4	4.2	4.3	5.3	9.8	13.7	13.0	9.4	9.5	1.6%	n/a	1.0%
Total imports	10.1	16.4	17.4	9.4	10.6	12.9	19.4	21.1	17.7	11.5	11.3	-2.2%	0.8%	1.1%
Pipeline exports	5.5	8.2	9.1	9.0	8.9	9.3	8.1	8.0	11.0	8.7	7.8	-10.5%	8.3%	0.8%
LNG exports*	71.8	103.8	128.7	130.3	135.2	132.2	125.4	126.0	122.3	125.9	128.8	2.3%	7.6%	13.1%
Total exports	77.3	112.0	137.9	139.3	144.2	141.5	133.5	133.9	133.2	134.6	136.6	1.4%	7.6%	13.9%
Africa														
LNG imports	-	-	-	-	-	-	3.9	10.7	8.3	3.2	-	-100.0%	n/a	-
Total imports	-	-	-	-	-	-	3.9	10.7	8.3	3.2	-	-100.0%	n/a	-
Pipeline exports	42.0	48.2	36.1	39.3	34.4	29.4	30.1	38.7	37.2	37.5	28.3	-24.4%	-2.6%	2.9%
LNG exports*	56.0	58.8	56.4	54.2	47.0	49.5	48.5	46.2	55.7	53.6	61.2	14.2%	-1.7%	6.2%
Total exports	98.0	106.9	92.4	93.5	81.4	78.8	78.6	84.9	92.9	91.1	89.5	-1.7%	-2.1%	9.1%
China														
Pipeline imports	-	3.4	13.6	20.8	26.4	30.3	32.4	36.8	39.9	47.9	47.7	-0.3%	n/a	4.8%
LNG imports	8.0	13.0	18.9	20.1	25.1	27.3	27.0	36.8	52.9	73.5	84.8	15.4%	31.8%	8.6%
Total imports	8.0	16.4	30.5	40.8	51.5	57.5	59.4	73.5	92.8	121.3	132.5	9.2%	38.6%	13.5%
LNG exports*	-	-	-	-	-	-	-	-	-	-	0.1	n/a	n/a	•
Total exports	-	-	-	-	-	-	-	-	-	-	0.1	n/a	n/a	•
India														
LNG imports	13.0	11.5	17.4	18.4	18.0	19.1	20.0	24.3	26.1	30.6	32.9	7.4%	10.5%	3.3%
Total imports	13.0	11.5	17.4	18.4	18.0	19.1	20.0	24.3	26.1	30.6	32.9	7.4%	10.5%	3.3%
LNG exports*	-	-	-	-	-	-	0.4	0.1	0.1	-	0.1	n/a	n/a	•
Total exports	-	-	-	-	-	-	0.4	0.1	0.1	-	0.1	n/a	n/a	•
OECD Asia														
Pipeline imports	6.0	5.5	5.9	5.4	6.3	5.9	6.7	6.5	5.8	5.9	5.2	-11.8%	-0.1%	0.5%
LNG imports	124.2	141.4	156.3	169.6	175.7	173.6	161.6	159.9	165.4	173.2	161.1	-7.0%	2.6%	16.4%
Total imports	130.2	146.8	162.2	174.9	182.1	179.5	168.4	166.4	171.2	179.1	166.3	-7.1%	2.5%	16.9%
LNG exports*	25.1	25.8	26.0	28.3	30.6	32.2	40.1	60.5	76.8	91.9	104.7	13.9%	16.0%	10.6%
Total exports	25.1	25.8	26.0	28.3	30.6	32.2	40.1	60.5	76.8	91.9	104.7	13.9%	16.0%	10.6%
Other Asia														
LNG imports	12.4	15.0	17.3	18.5	22.4	25.2	29.8	33.0	40.2	45.5	55.3	21.7%	13.7%	5.6%
Total imports	12.4	15.0	17.3	18.5	22.4	25.2	29.8	33.0	40.2	45.5	55.3	21.7%	13.7%	5.6%
Pipeline exports	6.0	5.5	5.9	5.4	6.5	5.8	10.5	10.2	9.0	8.7	9.6	9.7%	3.9%	1.0%
LNG exports*	66.3	72.5	71.5	65.0	66.2	69.3	75.0	75.8	78.5	72.4	72.4	•	0.7%	7.4%
Total exports	72.3	77.9	77.4	70.3	72.7	78.1	85.5	86.0	87.6	81.1	81.9	1.0%	1.0%	8.3%
Total World														
Inter-regional pipeline trade	420.5	435.6	466.9	460.3	459.5	436.1	445.6	479.7	510.3	507.9	499.4	-1.7%	-0.4%	50.7%
LNG trade	249.7	302.4	328.3	324.9	326.8	333.6	337.1	358.3	393.3	430.6	485.1	12.7%	6.2%	49.3%
Total trade	670.3	738.0	795.2	785.2	786.4	769.7	782.7	838.0	903.6	938.5	984.4	4.9%	2.1%	100.0%

*LNG exports include re-exports.
Pipeline trade excludes intra-regional trade.
†Less than 0.05%.
•Less than 0.05%.
n/a not available.
Note: 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.

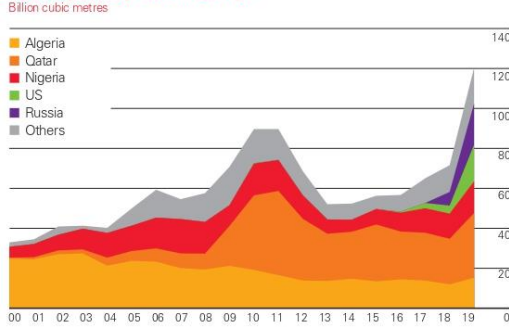
Natural gas: LNG imports

Billion cubic metres												Growth rate per annum		Share 2019
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019	2008-18	
Canada	1.0	2.0	3.2	1.6	1.0	0.5	0.6	0.3	0.4	0.6	0.5	-13.2%	n/a	0.1%
Mexico	3.7	6.1	3.8	4.9	7.8	9.3	6.8	5.6	6.6	6.9	6.6	-4.4%	6.2%	1.4%
US	12.6	12.1	9.9	4.9	2.7	1.7	2.5	2.4	2.2	2.1	1.5	-30.9%	-14.2%	0.3%
Total North America	17.3	20.2	16.8	11.4	11.4	11.5	10.0	8.3	9.2	9.6	8.6	-10.8%	-3.4%	1.8%
Argentina	1.0	1.9	3.7	4.7	6.3	6.2	5.6	5.1	4.6	3.6	1.7	-51.9%	23.7%	0.4%
Brazil	0.4	2.8	0.7	3.5	5.2	7.1	6.8	2.6	1.7	2.9	3.2	12.2%	n/a	0.7%
Chile	0.7	3.1	3.7	4.0	3.8	3.5	3.7	4.5	4.4	4.3	3.3	-22.2%	n/a	0.7%
Other S. & Cent. America	1.4	1.4	1.9	2.4	2.8	2.8	2.8	3.0	2.8	3.7	4.8	29.5%	10.7%	1.0%
Total S. & Cent. America	3.5	9.2	9.9	14.6	18.1	19.6	18.9	15.2	13.5	14.5	13.1	-8.5%	23.4%	2.7%
Belgium	6.8	6.5	6.3	4.1	3.1	2.9	3.6	2.4	1.3	3.3	7.2	117.9%	0.9%	1.5%
France	13.3	14.7	14.4	9.8	8.3	6.9	6.4	9.1	10.9	12.7	22.9	79.8%	-0.1%	4.7%
Italy	3.0	9.3	9.1	7.1	5.8	4.5	5.9	5.9	8.2	8.2	13.5	64.2%	17.5%	2.8%
Spain	27.5	28.2	23.9	21.4	15.7	16.2	13.7	13.8	16.6	15.0	21.9	46.0%	-6.6%	4.5%
Turkey	6.0	7.8	5.9	7.6	5.9	7.1	7.5	7.6	10.9	11.4	12.9	12.4%	7.5%	2.7%
United Kingdom	10.1	18.8	24.7	13.9	9.2	11.2	13.7	10.7	6.6	7.2	18.0	151.9%	24.3%	3.7%
Other EU	3.7	3.9	4.9	4.4	3.7	3.3	5.2	6.9	10.2	13.4	23.4	74.7%	13.6%	4.8%
Rest of Europe	-	†	-	†	-	†	-	†	0.1	†	†	26.8%	n/a	-
Total Europe	70.5	89.1	89.2	68.2	51.8	52.1	56.0	56.4	64.7	71.3	119.8	68.1%	2.2%	24.7%
Egypt	-	-	-	-	-	-	3.9	10.7	8.3	3.2	-	-100.0%	n/a	-
Kuwait	0.9	2.8	3.0	2.8	2.3	3.6	4.3	4.7	4.8	4.3	5.1	19.0%	n/a	1.1%
United Arab Emirates	-	0.2	1.4	1.4	1.6	1.6	2.9	4.2	3.0	1.0	1.6	55.0%	n/a	0.3%
Other Middle East & Africa	-	-	-	-	0.5	0.1	2.7	4.8	5.3	4.0	2.8	-30.9%	n/a	0.6%
Total Middle East & Africa	0.9	3.0	4.4	4.2	4.3	5.3	13.7	24.5	21.4	12.5	9.5	-24.1%	n/a	2.0%
China	8.0	13.0	16.9	20.1	25.1	27.3	27.0	36.8	52.9	73.5	84.8	15.4%	31.8%	17.5%
India	13.0	11.5	17.4	18.4	18.0	19.1	20.0	24.3	26.1	30.6	32.9	7.4%	10.5%	6.8%
Japan	88.9	96.4	108.6	119.8	120.4	121.8	115.9	113.6	113.9	113.0	105.5	-6.6%	1.7%	21.7%
Malaysia	-	-	-	-	2.0	2.2	2.2	1.5	2.0	1.8	3.3	85.7%	n/a	0.7%
Pakistan	-	-	-	-	-	-	1.5	4.0	6.1	9.4	11.8	25.6%	n/a	2.4%
Singapore	-	-	-	-	-	-	3.0	3.2	4.1	4.5	5.0	10.1%	n/a	1.0%
South Korea	35.3	45.0	47.7	49.7	55.3	51.8	45.8	46.3	51.4	60.2	55.6	-7.6%	4.6%	11.5%
Taiwan	12.4	15.0	16.3	17.1	17.2	18.6	19.6	20.4	22.7	22.9	22.8	-0.5%	6.2%	4.7%
Thailand	-	-	1.1	1.4	2.0	1.9	3.6	3.9	5.2	6.0	6.7	11.5%	n/a	1.4%
Other Asia Pacific	-	-	-	0.1	-	-	-	-	-	0.8	5.7	576.6%	n/a	1.2%
Total Asia Pacific	157.5	180.9	207.9	226.6	241.2	245.2	238.5	253.9	284.6	322.7	334.1	3.5%	7.1%	68.9%
Total LNG imports	249.7	302.4	328.3	324.9	326.8	333.6	337.1	358.3	393.3	430.6	485.1	12.7%	6.2%	100.0%

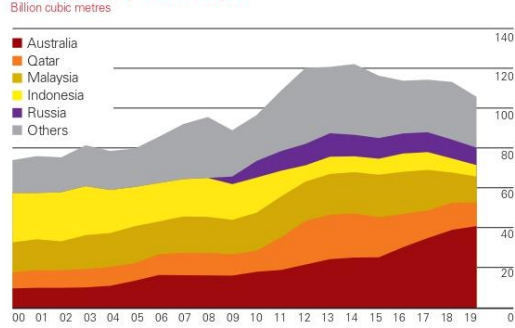
Gross LNG trade
†Less than 0.05%
*Less than 0.05%
n/a not available.

Source: includes GIGNL, IHS.

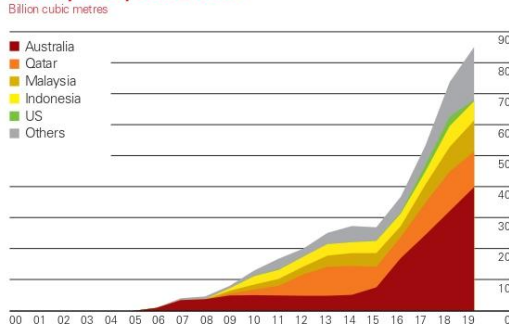
LNG imports by source: Europe



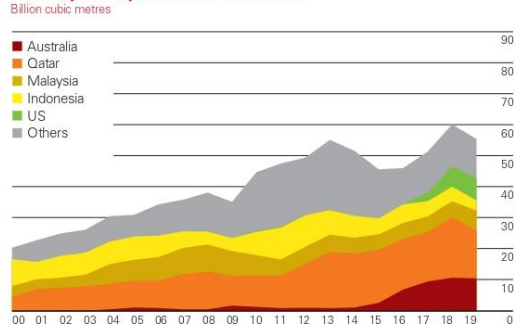
LNG imports by source: Japan



LNG imports by source: China



LNG imports by source: South Korea



Natural gas: LNG exports

Billion cubic metres												Growth rate per annum			Share 2019
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019	2008-18		
US	0.8	1.5	1.8	0.8	0.2	0.4	0.7	4.0	17.1	28.6	47.5	66.3%	39.7%	9.8%	
Peru	–	1.9	5.2	5.1	5.7	5.7	5.0	5.5	5.5	4.8	5.2	8.6%	n/a	1.1%	
Trinidad & Tobago	19.5	19.6	18.2	18.3	18.4	17.6	16.4	14.3	13.5	16.6	17.0	2.6%	-0.9%	3.5%	
Other Americas*	–	–	0.1	0.5	0.1	0.2	†	0.6	0.3	0.1	0.1	-14.5%	n/a	–	
Total Americas	20.3	22.9	25.2	24.7	24.3	23.9	22.1	24.5	36.5	50.1	69.8	39.5%	10.0%	14.4%	
Russia	6.8	13.5	14.3	14.3	14.5	13.6	14.6	14.6	15.4	24.9	39.4	57.9%	n/a	8.1%	
Norway	3.1	4.6	4.4	4.6	3.8	4.6	5.6	6.1	5.4	6.8	6.6	-2.1%	12.2%	1.4%	
Other Europe*	0.2	0.5	1.7	3.6	5.2	8.4	5.4	4.5	2.5	5.0	2.0	-59.9%	28.5%	0.4%	
Total Europe & CIS	10.2	18.6	20.4	22.4	23.5	26.6	25.6	25.3	23.4	36.7	48.0	30.8%	30.6%	9.9%	
Oman	11.8	11.7	11.0	11.1	11.5	10.6	10.2	11.0	11.4	13.6	14.1	3.6%	1.9%	2.9%	
Qatar	51.8	77.8	100.7	104.0	105.8	103.6	105.6	107.3	103.6	104.9	107.1	2.0%	9.8%	22.1%	
United Arab Emirates	7.8	8.7	8.3	8.1	7.9	8.6	7.6	7.7	7.3	7.4	7.7	3.5%	-1.2%	1.6%	
Yemen	0.4	5.5	8.8	7.1	9.9	9.4	1.9	–	–	–	–	n/a	n/a	–	
Total Middle East	71.8	103.8	128.7	130.3	135.2	125.4	126.0	122.3	125.9	128.8	128.8	2.3%	7.6%	26.5%	
Algeria	21.4	19.5	16.7	14.9	15.0	17.4	16.6	15.5	16.4	13.1	16.6	26.4%	-5.0%	3.4%	
Angola	–	–	–	–	–	0.4	0.4	–	0.9	5.0	5.8	11.7%	n/a	1.2%	
Egypt	13.1	10.0	9.0	6.9	3.9	0.4	–	0.8	1.2	2.0	4.5	129.8%	-17.8%	0.9%	
Nigeria	16.1	24.1	25.7	27.9	22.5	26.1	26.9	24.6	28.2	27.9	28.8	3.3%	2.1%	5.9%	
Other Africa	5.4	5.3	5.0	4.6	5.2	5.0	5.0	4.4	4.9	5.5	5.5	0.9%	0.5%	1.1%	
Total Africa	56.0	58.8	56.4	54.2	47.0	49.5	48.5	46.2	55.7	53.6	61.2	14.2%	-1.7%	12.6%	
Australia	25.1	25.8	26.0	28.3	30.5	32.0	39.9	60.4	76.6	91.8	104.7	14.0%	16.0%	21.6%	
Brunei	9.0	9.0	9.6	9.2	9.5	8.6	8.7	8.6	9.1	8.5	8.8	3.0%	-1.0%	1.8%	
Indonesia	26.9	32.4	28.7	24.4	23.1	21.7	21.6	22.4	21.7	20.8	16.5	-20.8%	-2.9%	3.4%	
Malaysia	30.4	31.0	33.2	31.4	33.6	34.0	34.3	33.6	36.1	33.0	35.1	6.5%	0.8%	7.2%	
Papua New Guinea	–	–	–	–	–	5.0	10.1	10.9	11.1	9.5	11.6	22.2%	n/a	2.4%	
Other Asia Pacific*	–	–	–	–	0.1	0.2	0.8	0.5	0.8	0.6	0.5	-12.7%	n/a	0.1%	
Total Asia Pacific	91.5	98.3	97.5	93.3	96.8	101.5	115.5	136.4	155.4	164.3	177.3	7.9%	6.4%	36.5%	
Total LNG exports	249.7	302.4	328.3	324.9	326.8	333.6	337.1	358.3	393.3	430.6	485.1	12.7%	6.2%	100.0%	

Gross LNG trade.
 †Largely consists of re-exports.
 *Less than 0.05%.
 ‡Less than 0.05.
 n/a not available.

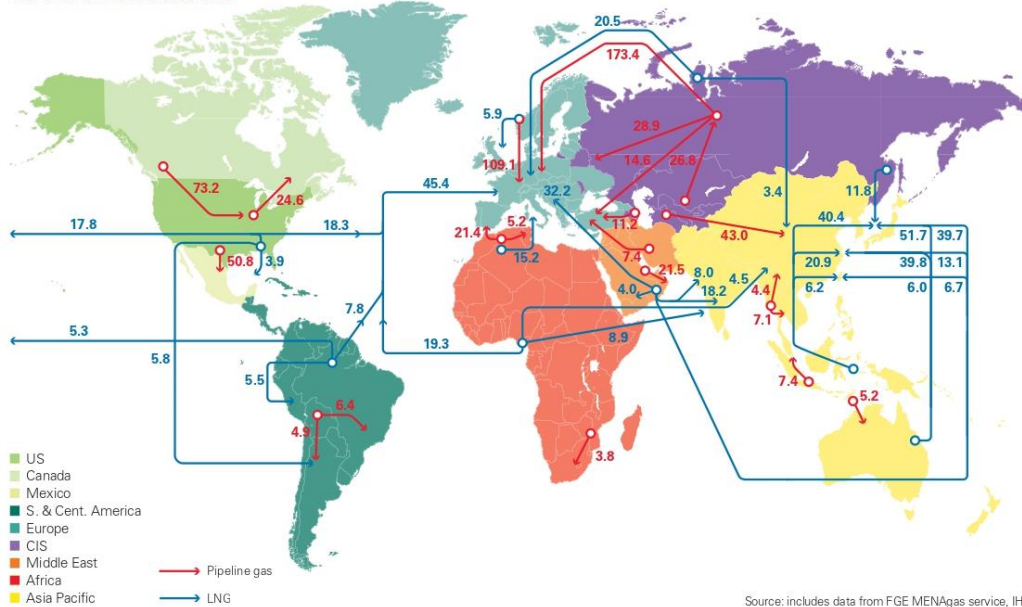
Source: includes GIGNL, IHS.

Natural gas: Trade movements 2019 as LNG*

Billion cubic metres	From																										Total imports
	US	Peru	Trinidad & Tobago	Other Americas*	Norway	Other Europe*	Russian Federation	Oman	Qatar	United Arab Emirates	Yemen	Algeria	Angola	Egypt	Nigeria	Other Africa	Australia	Brunei	Indonesia	Malaysia	Papua New Guinea	Other Asia Pacific*					
To																											
Canada	†	0.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.5	
Mexico	3.9	–	0.6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6.6	
US	–	–	1.3	†	–	0.1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.5	
North America	3.9	–	2.4	†	–	0.1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	8.6	
Argentina	1.0	–	0.7	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1.7	
Brazil	1.5	–	0.7	0.1	0.3	–	–	–	–	–	–	–	0.1	–	0.3	0.3	–	–	–	–	–	–	–	–	–	3.2	
Chile	2.3	–	0.9	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3.3	
Other S. & Cent. America	1.0	–	3.3	–	0.3	0.2	–	–	–	–	–	–	–	†	0.1	–	–	–	–	–	–	–	–	–	–	4.8	
S. & Cent. America	5.8	–	5.5	0.1	0.6	0.2	–	–	–	–	–	–	–	†	0.4	0.5	–	–	–	–	–	–	–	–	–	13.1	
Belgium	0.3	–	–	–	–	2.1	–	4.6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	7.2	
France	3.1	0.4	0.3	–	1.5	†	6.9	–	1.9	–	–	3.6	0.4	–	4.4	–	–	–	–	–	–	–	–	–	–	22.9	
Italy	1.6	–	1.5	–	0.2	0.1	–	–	6.4	–	–	2.9	–	0.5	0.1	0.1	–	–	–	–	–	–	–	–	–	13.5	
Spain	4.5	0.5	2.8	–	0.7	0.1	3.2	–	4.4	–	–	1.1	0.3	–	4.3	0.2	–	–	–	–	–	–	–	–	–	21.9	
Turkey	1.2	–	0.2	–	0.1	0.1	–	–	2.5	–	–	5.8	–	0.5	2.5	0.1	–	–	–	–	–	–	–	–	–	12.9	
United Kingdom	2.9	0.3	0.8	–	0.3	0.1	3.1	–	8.8	–	–	1.0	0.1	–	0.3	0.3	–	–	–	–	–	–	–	–	–	18.0	
Other EU	4.7	0.5	0.5	–	3.1	0.2	5.1	–	3.5	–	–	0.8	0.3	0.3	4.2	–	–	–	–	–	–	–	–	–	–	23.4	
Rest of Europe	–	–	–	–	†	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	†	
Europe	18.3	1.7	6.1	–	5.9	0.6	20.5	–	32.2	–	–	15.2	1.2	1.7	15.8	0.7	–	–	–	–	–	–	–	–	–	119.8	
Egypt	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
Kuwait	0.3	–	0.2	–	–	–	–	–	1.0	2.7	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5.1	
United Arab Emirates	0.6	–	0.1	–	0.1	0.2	0.1	–	–	–	–	–	0.2	0.1	0.2	–	–	–	–	–	–	–	–	–	–	1.6	
Other Middle East & Africa	0.9	–	0.9	–	0.1	0.6	0.1	0.1	–	–	–	–	–	–	–	–	0.1	–	–	–	–	–	–	–	–	2.8	
Middle East & Africa	1.7	–	1.2	–	0.2	0.8	1.2	2.8	–	–	–	0.1	0.4	0.2	0.8	–	–	–	–	–	–	–	–	–	–	9.5	
China	0.4	0.9	1.0	†	0.1	0.4	3.4	1.5	11.4	0.2	–	0.1	0.2	0.3	2.6	1.5	39.8	0.8	6.2	10.0	3.9	0.2	–	–	–	84.8	
India	2.6	–	0.2	–	0.1	0.5	0.3	1.3	13.2	3.6	–	0.3	3.7	0.3	3.6	1.2	1.4	–	–	–	–	–	–	–	–	32.9	
Japan	5.0	0.9	–	–	–	–	8.7	3.9	11.9	3.0	–	0.1	–	0.1	1.1	0.1	41.0	5.9	5.7	12.8	5.1	0.2	–	–	–	105.5	
Malaysia	0.1	–	–	–	–	–	–	–	–	–	–	–	–	–	0.1	0.1	2.1	1.0	–	–	–	–	–	–	–	3.3	
Pakistan	0.7	–	–	–	–	–	–	0.3	7.2	0.6	–	0.4	–	0.9	1.3	0.3	–	–	–	0.1	–	–	–	–	–	11.8	
Singapore	0.8	–	0.2	–	–	–	–	–	0.1	–	–	–	–	0.6	0.1	0.3	–	–	–</								

Major trade movements 2019

Trade flows worldwide (billion cubic metres)



Source: includes data from FGE MENAgas service, IHS.

Natural gas: Trade movements 2019 by pipeline

Billion cubic metres	From																				Total imports			
	Canada	Mexico	US	Bolivia	Other S. & Cent. America	Netherlands	Norway	Other Europe	Azerbaijan	Kazakhstan	Russian Federation	Turkmenistan	Uzbekistan	Iran	Qatar	Other Middle East	Algeria	Libya	Other Africa	Indonesia		Myanmar	Other Asia Pacific	
Canada	-	-	24.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24.6
Mexico	-	-	50.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50.8
US	73.2	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	73.3
North America	73.2	0.1	75.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	148.7
Argentina	-	-	-	4.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.9
Brazil	-	-	-	6.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.4
Other S. & Cent. America	-	-	-	-	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7
S. & Cent. America	-	-	-	11.3	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.0
Belgium	-	-	-	-	-	6.6	5.1	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.6
France	-	-	-	-	-	4.4	19.3	5.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37.2
Germany	-	-	-	-	-	23.4	27.8	2.9	-	7.8	-	-	-	-	-	-	-	-	-	-	-	-	-	109.6
Italy	-	-	-	-	-	1.2	2.7	14.2	-	20.7	-	-	-	-	-	-	9.7	5.4	-	-	-	-	-	54.1
Netherlands	-	-	-	-	-	-	25.3	6.7	-	8.0	-	-	-	-	-	-	-	-	-	-	-	-	-	40.0
Spain	-	-	-	-	-	-	1.8	2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.0
Turkey	-	-	-	-	-	-	-	-	9.2	14.6	-	-	-	7.4	-	-	11.4	-	-	-	-	-	-	31.3
Ukraine	-	-	-	-	-	-	-	11.0	-	4.7	-	-	-	-	-	-	-	-	-	-	-	-	-	11.0
United Kingdom	-	-	-	-	-	1.6	26.6	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33.2
Other EU	-	-	-	-	-	1.0	0.4	37.5	-	73.9	-	-	-	-	-	-	0.4	-	-	-	-	-	-	113.2
Rest of Europe	-	-	-	-	-	0.1	-	8.3	2.0	2.7	-	-	-	-	-	-	-	-	-	-	-	-	-	13.0
Europe	-	-	-	-	-	38.2	109.1	90.5	11.2	188.0	-	-	-	7.4	-	-	21.4	5.4	-	-	-	-	-	471.3
Belarus	-	-	-	-	-	-	-	-	-	19.0	-	-	-	-	-	-	-	-	-	-	-	-	-	19.0
Kazakhstan	-	-	-	-	-	-	-	-	-	5.1	-	1.8	-	-	-	-	-	-	-	-	-	-	-	6.9
Russian Federation	-	-	-	-	-	-	-	-	-	20.6	-	6.2	-	-	-	-	-	-	-	-	-	-	-	26.8
Other CIS	-	-	-	-	-	-	-	-	-	0.4	4.8	0.4	0.4	-	-	-	-	-	-	-	-	-	-	5.9
CIS	-	-	-	-	-	-	-	-	-	20.9	28.9	8.4	0.4	-	-	-	-	-	-	-	-	-	-	58.5
United Arab Emirates	-	-	-	-	-	-	-	-	-	-	-	-	-	19.5	-	-	-	-	-	-	-	-	-	19.5
Other Middle East	-	-	-	-	-	-	-	-	0.3	-	-	-	-	9.1	2.0	0.1	-	-	1.4	-	-	-	-	13.0
Middle East	-	-	-	-	-	-	-	-	0.3	-	-	-	-	9.1	21.5	0.1	-	-	1.4	-	-	-	-	32.5
South Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.2	-	-	-	-	-	-	3.8
Other Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	6.0
Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.2	-	4.6	-	-	-	-	9.8
Australia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.2	-	5.2
China	-	-	-	-	-	-	-	-	-	6.5	0.3	31.6	4.9	-	-	-	-	-	-	-	-	-	-	47.7
Malaysia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	4.4	-	0.6
Singapore	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.8	-	1.3	-	8.1
Thailand	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.1	-	-	7.1
Asia Pacific	-	-	-	-	-	-	-	-	-	6.5	0.3	31.6	4.9	-	-	-	-	-	-	7.4	11.5	6.5	-	68.7
Total exports	73.2	0.1	75.4	11.3	0.7	38.2	109.1	90.5	11.5	27.5	217.2	31.6	13.2	16.9	21.5	0.1	26.7	5.4	6.0	7.4	11.5	6.5	6.5	801.5

Source: includes data from FGE MENAgas service, IHS.

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

Total proved reserves at end 2019

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

*More than 500 years.

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

*Less than 0.05%.

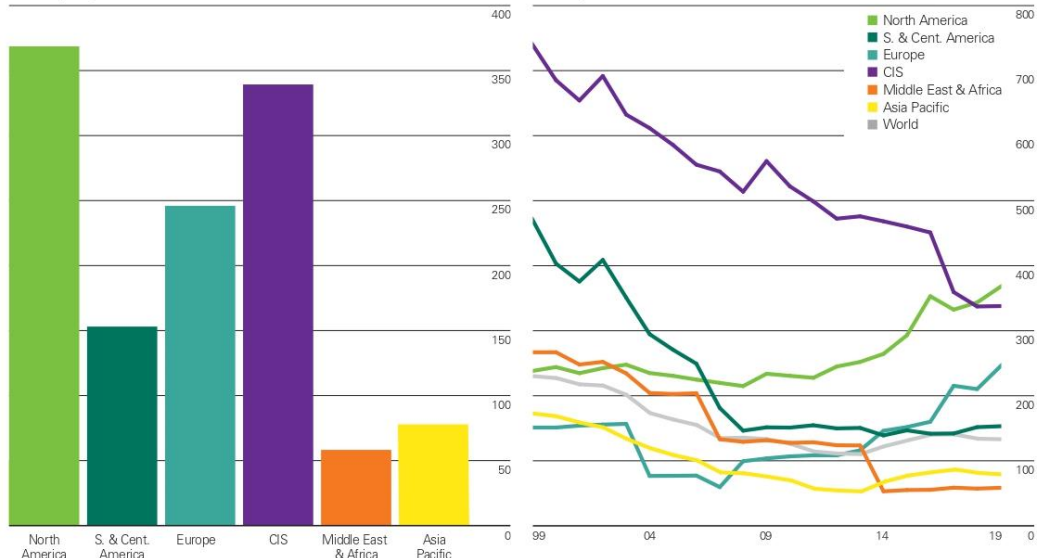
Notes: Total proved reserves of coal – generally taken to be those quantities that geological and engineering information indicates with reasonable certainty can be recovered in the future from known reservoirs under existing economic and operating conditions. The data series for total proved coal reserves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

Reserves-to-production (R/P) ratios are calculated excluding other solid fuels in reserves and production. Shares of total and R/P ratios are calculated using million tonnes figures.

Reserves-to-production (R/P) ratios

Years

2019 by region

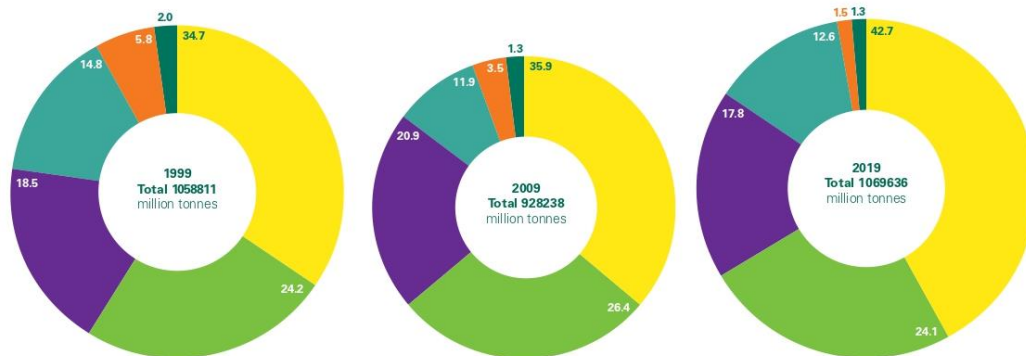


World coal reserves in 2019 stood at 1070 billion tonnes and are heavily concentrated in just a few countries: US (23%), Russia (15%), Australia (14%) and China (13%). Most of the reserves are anthracite and bituminous (70%). The current global R/P ratio shows that coal reserves in 2019 accounted for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

Distribution of proved reserves in 1999, 2009 and 2019

Percentage

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



Coal: Production*

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

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

†Less than 0.05%.

•Less than 0.05%.

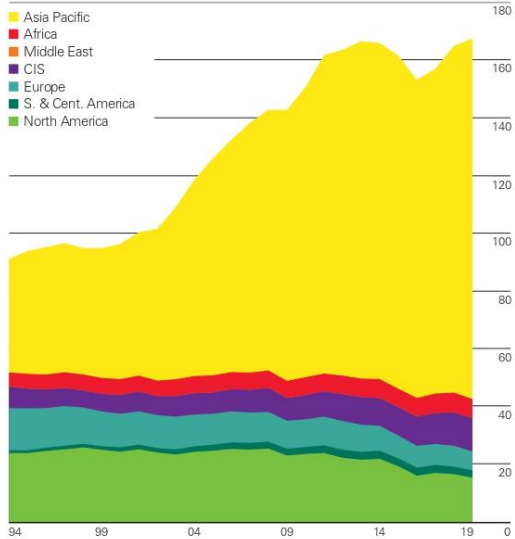
Coal production data expressed in million tonnes is available at bp.com/statisticalreview.

Coal: Consumption*

Exajoules	2009-2018											Growth rate per annum		Share 2019	
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019	2008-18		
Canada	0.98	1.04	0.93	0.88	0.87	0.82	0.83	0.78	0.78	0.65	0.56	-14.1%	-6.2%	0.4%	
Mexico	0.43	0.53	0.62	0.54	0.53	0.53	0.53	0.52	0.64	0.57	0.51	-10.5%	3.0%	0.3%	
US	19.74	20.88	19.70	17.42	18.08	18.04	15.58	14.26	13.87	13.28	11.34	-14.6%	-5.1%	7.2%	
Total North America	21.15	22.45	21.25	18.84	19.48	19.39	16.95	15.56	15.28	14.50	12.41	-14.4%	-5.0%	7.9%	
Argentina	0.03	0.05	0.05	0.05	0.05	0.06	0.06	0.04	0.05	0.05	0.02	-53.7%	-2.4%	•	
Brazil	0.47	0.61	0.65	0.64	0.69	0.73	0.74	0.67	0.70	0.70	0.66	-5.8%	1.9%	0.4%	
Chile	0.17	0.19	0.24	0.28	0.32	0.32	0.31	0.31	0.32	0.31	0.28	-8.7%	5.5%	0.2%	
Colombia	0.17	0.20	0.16	0.20	0.21	0.22	0.21	0.23	0.17	0.16	0.26	63.0%	-1.6%	0.2%	
Ecuador	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Peru	0.03	0.03	0.03	0.04	0.04	0.04	0.03	0.04	0.04	0.03	0.02	-32.6%	-1.8%	•	
Trinidad & Tobago	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Venezuela	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	†	†	-34.4%	-2.0%	•	
Other S. & Cent. America	0.09	0.10	0.12	0.12	0.13	0.15	0.15	0.16	0.14	0.18	0.24	33.7%	5.4%	0.2%	
Total S. & Cent. America	0.98	1.19	1.26	1.33	1.45	1.52	1.50	1.46	1.43	1.48	1.48	3.7%	2.1%	0.9%	
Austria	0.12	0.14	0.15	0.13	0.14	0.13	0.14	0.13	0.13	0.12	0.13	5.2%	-2.8%	0.1%	
Belgium	0.12	0.16	0.15	0.14	0.15	0.14	0.14	0.13	0.13	0.13	0.13	-2.1%	-3.8%	0.1%	
Czech Republic	0.76	0.79	0.77	0.74	0.71	0.69	0.68	0.69	0.65	0.65	0.60	-6.9%	-2.4%	0.4%	
Finland	0.22	0.28	0.23	0.19	0.21	0.19	0.16	0.18	0.17	0.18	0.15	-16.6%	-2.4%	0.1%	
France	0.45	0.48	0.41	0.46	0.48	0.36	0.35	0.34	0.35	0.35	0.27	-23.2%	-5.6%	0.2%	
Germany	3.00	3.23	3.28	3.37	3.47	3.33	3.29	3.20	3.01	2.90	2.30	-20.7%	-1.4%	1.5%	
Greece	0.35	0.33	0.33	0.34	0.29	0.28	0.24	0.18	0.20	0.19	0.14	-27.6%	-5.8%	0.1%	
Hungary	0.11	0.11	0.11	0.11	0.10	0.09	0.10	0.09	0.09	0.09	0.08	-11.3%	-3.5%	•	
Italy	0.52	0.57	0.64	0.66	0.57	0.55	0.52	0.46	0.40	0.37	0.30	-19.3%	-5.7%	0.2%	
Netherlands	0.31	0.32	0.31	0.34	0.34	0.38	0.46	0.43	0.38	0.34	0.27	-22.5%	0.3%	0.2%	
Norway	0.02	0.03	0.04	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.6%	1.3%	•	
Poland	2.17	2.31	2.30	2.14	2.23	2.07	2.04	2.07	2.08	2.08	1.91	-8.4%	-1.0%	1.2%	
Portugal	0.12	0.07	0.09	0.12	0.11	0.11	0.14	0.12	0.14	0.11	0.06	-49.4%	0.8%	•	
Romania	0.32	0.29	0.34	0.32	0.25	0.24	0.25	0.22	0.23	0.21	0.19	-10.7%	-5.9%	0.1%	
Spain	0.39	0.29	0.54	0.65	0.48	0.49	0.57	0.44	0.56	0.46	0.21	-54.6%	-2.0%	0.1%	
Sweden	0.08	0.12	0.10	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.08	2.2%	-3.5%	0.1%	
Switzerland	0.01	0.01	0.01	0.01	0.01	0.01	0.01	†	†	†	†	†	†	•	
Turkey	1.29	1.32	1.42	1.53	1.32	1.51	1.45	1.61	1.65	1.71	1.70	-0.8%	3.3%	1.1%	
Ukraine	1.50	1.60	1.74	1.79	1.73	1.49	1.14	1.36	1.08	1.15	1.10	-4.5%	-4.1%	0.7%	
United Kingdom	1.25	1.29	1.32	1.63	1.55	1.25	0.97	0.46	0.38	0.32	0.26	-17.4%	-14.3%	0.2%	
Other Europe	1.54	1.60	1.71	1.55	1.55	1.42	1.44	1.44	1.43	1.41	1.43	1.4%	-1.5%	0.9%	
Total Europe	14.67	15.34	15.99	16.34	15.81	14.84	14.20	13.68	13.23	12.92	11.35	-12.1%	-2.3%	7.2%	
Azerbaijan	†	†	†	†	†	†	†	†	†	†	†	-	-10.4%	•	
Belarus	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.04	0.04	0.04	6.7%	3.2%	•	
Kazakhstan	1.30	1.40	1.52	1.58	1.57	1.55	1.43	1.42	1.52	1.70	1.67	-1.9%	1.9%	1.1%	
Russian Federation	3.86	3.79	3.94	4.12	3.79	3.67	3.86	3.74	3.51	3.63	3.63	•	-1.5%	2.3%	
Turkmenistan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Uzbekistan	0.04	0.04	0.05	0.05	0.07	0.06	0.06	0.05	0.06	0.09	0.07	-14.5%	7.2%	•	
Other CIS	0.04	0.04	0.05	0.05	0.06	0.07	0.08	0.07	0.08	0.09	0.12	33.7%	7.5%	0.1%	
Total CIS	5.26	5.30	5.58	5.84	5.52	5.38	5.46	5.32	5.22	5.54	5.53	-0.2%	-0.4%	3.5%	
Iran	0.06	0.05	0.06	0.05	0.06	0.07	0.07	0.06	0.07	0.06	0.05	-6.7%	1.2%	•	
Iraq	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Israel	0.32	0.32	0.33	0.37	0.30	0.28	0.27	0.23	0.21	0.20	0.21	6.2%	-5.0%	0.1%	
Kuwait	-	†	†	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-5.3%	76.0%	•	
Oman	†	†	†	†	†	†	†	†	†	†	0.01	120.7%	51.1%	•	
Qatar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Saudi Arabia	-	-	-	-	0.01	0.01	0.01	†	†	†	†	-	-	4.8%	•
United Arab Emirates	0.01	0.03	0.02	0.06	0.07	0.08	0.07	0.08	0.09	0.10	0.10	2.2%	21.5%	0.1%	
Other Middle East	0.01	0.01	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	-	8.9%	•	
Total Middle East	0.40	0.42	0.43	0.50	0.47	0.47	0.44	0.40	0.40	0.39	0.40	3.6%	-0.5%	0.3%	
Algeria	0.02	0.01	0.01	0.01	0.01	0.01	0.01	†	†	†	0.02	-	-4.1%	•	
Egypt	0.03	0.02	0.02	0.02	0.02	0.02	0.03	0.05	0.05	0.09	0.08	-7.8%	11.9%	0.1%	
Morocco	0.11	0.12	0.12	0.13	0.13	0.17	0.19	0.18	0.19	0.22	0.28	29.4%	3.5%	0.2%	
South Africa	3.93	3.89	3.79	3.70	3.70	3.75	3.52	3.78	3.72	3.76	3.81	1.4%	-0.4%	2.4%	
Other Africa	0.14	0.16	0.18	0.16	0.22	0.32	0.29	0.26	0.29	0.32	0.28	-13.4%	9.9%	0.2%	
Total Africa	4.23	4.19	4.12	4.02	4.07	4.26	4.03	4.27	4.26	4.41	4.47	1.5%	0.4%	2.8%	
Australia	2.36	2.19	2.13	2.00	1.89	1.88	1.95	1.94	1.88	1.84	1.78	-3.3%	-2.8%	1.1%	
Bangladesh	0.05	0.03	0.05	0.04	0.05	0.03	0.11	0.08	0.09	0.10	0.14	41.0%	10.1%	0.1%	
China	70.58	73.22	79.71	80.71	82.44	81.83	80.13	79.09	79.28	79.83	81.67	2.3%	1.7%	51.7%	
China Hong Kong SAR	0.30	0.26	0.31	0.31	0.33	0.34	0.28	0.28	0.26	0.26	0.26	-1.6%	-0.9%	0.2%	
India	11.76	12.16	12.75	13.82	14.77	16.23	16.55	16.86	17.46	18.56	18.62	0.3%	5.5%	11.8%	
Indonesia	1.39	1.65	1.96	2.22	2.39	1.89	2.14	2.23	2.39	2.84	3.41	20.0%	8.0%	2.2%	
Japan	4.27	4.87	4.62	4.88	5.07	4.99	5.03	5.02	5.10	4.99	4.91	-1.7%	-0.2%	3.1%	
Malaysia	0.44	0.62	0.62	0.66	0.63	0.64	0.73	0.78	0.87	0.93	0.90	-3.2%	8.5%	0.6%	
New Zealand	0.07	0.06	0.06	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.06	14.2%	-4.7%	•	
Pakistan	0.21	0.19	0.17	0.17	0.13	0.20	0.19	0.22	0.30	0.50	0.55	11.2%	7.0%	0.3%	
Philippines	0.25	0.29	0.32	0.34	0.42	0.45	0.49	0.55	0.65	0.68	0.73	6.6%	9.9%	0.5%	
Singapore	†	†	†	†	0.01	0.02	0.02	0.02	0.04	0.02	0.03	30.8%	58.1%	•	
South Korea	2.87	3.23	3.50	3.38	3.41	3.53	3.58	3.41	3.61	3.63	3.44	-5.3%	2.7%	2.2%	
Sri Lanka	†	†	0.01	0.02	0.02	0.04	0.05	0.05	0.06	0.06	0.06	10.3%	37.2%	•	
Taiwan	1.51	1.60	1.67	1.65	1.69	1.71	1.64	1.67	1.70	1.70	1.63	-4.0%	0.8%	1.0%	
Thailand	0.63	0.65	0.66	0.69	0.68	0.75	0.73	0.75	0.75	0.80	0.71	-10.9%	2.5%	0.5%	
Vietnam	0.47	0.61	0.73	0.67	0.72	0.87	1.10	1.19	1.19	1.59	2.07	30.2%	12.3%	1.3%	
Other Asia Pacific	0.69	0.67	0.56	0.58	0.45	0.51	0.49	0.60	0.61	1.23	1.25	1.2%	3.		

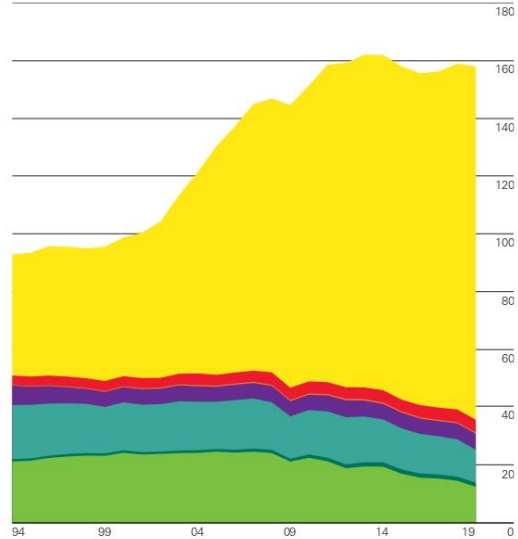
Coal: Production by region

Exajoules



Coal: Consumption by region

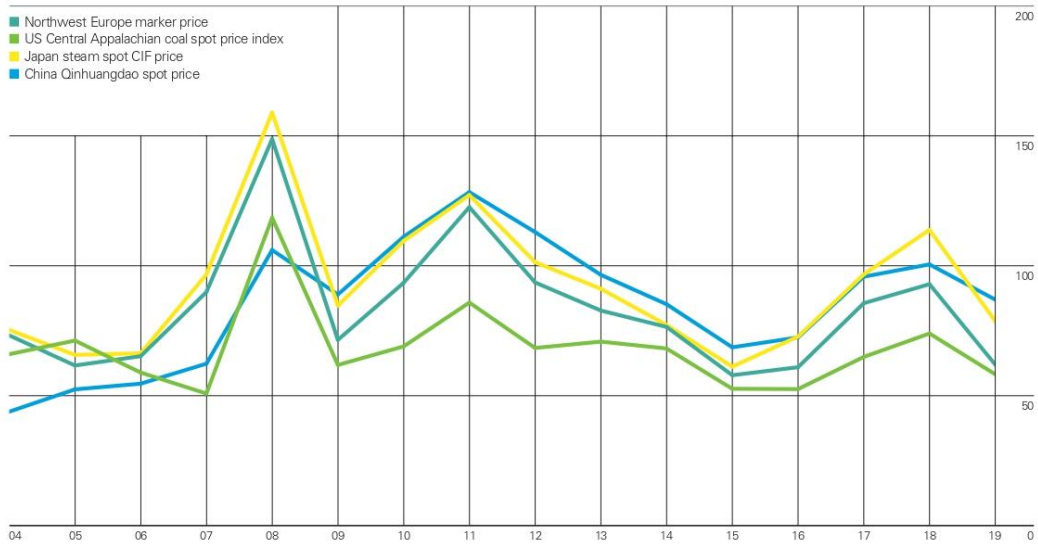
Exajoules



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

Coal prices

US dollars per tonne



Coal: Prices

US dollars per tonne	Northwest Europe marker price†	US Central Appalachian coal spot price index‡	Japan steam spot CIF price†	China Qinhuangdao spot price†
1999	28.79	31.29	—	—
2000	35.99	29.90	—	27.52
2001	39.03	50.15	37.69	31.78
2002	31.65	33.20	31.47	33.19
2003	43.60	38.52	39.61	31.74
2004	72.13	64.90	74.22	42.76
2005	60.54	70.12	64.62	51.34
2006	64.11	57.82	65.22	53.53
2007	88.79	49.73	95.59	61.23
2008	147.67	117.42	157.88	104.97
2009	70.39	60.73	83.59	87.86
2010	92.35	67.87	108.47	110.08
2011	121.48	84.75	126.13	127.27
2012	92.50	67.28	100.30	111.89
2013	81.69	69.72	90.07	95.42
2014	75.38	67.08	76.13	84.12
2015	56.79	51.57	60.10	67.53
2016	59.87	51.45	71.66	71.35
2017	84.51	63.83	95.57	94.72
2018	91.83	72.84	112.73	99.45
2019	60.86	57.16	77.63	85.89

†Source: IHS Northwest Europe prices for 1999-2000 are the average of the monthly marker, 2001-2019 the average of weekly prices. IHS Japan prices basis = 6,000 kilocalories per kilogram NAR CIF. Chinese prices are the average monthly price for 2000-2005, weekly prices 2006-2019, 5,500 kilocalories per kilogram NAR, including cost and freight (CFR).
 ‡Source: S&P Global Platts ©2020, S&P Global Inc. Prices are for Central Appalachian 12,500 BTU, 1.2 SO₂ coal, FOB. Prices for 1999-2000 are by coal price publication date, 2001-2005 by coal price assessment date, 2006-2019 weekly CAPF 12,500 BTU, 1.6 SO₂ coal, FOB.
 Note: CIF = cost+insurance+freight (levy price); FOB = free on board.

Coal: Trade movements

Exajoules											Growth rate per annum		Share 2019	
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019		2008-18
Imports														
Canada	0.36	0.36	0.24	0.23	0.22	0.26	0.22	0.19	0.22	0.23	0.21	-11.7%	-10.0%	0.6%
Mexico	0.18	0.22	0.21	0.22	0.20	0.22	0.23	0.21	0.34	0.34	0.24	-27.9%	9.9%	0.7%
US	0.57	0.51	0.36	0.27	0.24	0.28	0.28	0.25	0.19	0.15	0.17	11.5%	-16.7%	0.5%
S. & Cent. America	0.67	0.85	0.99	0.88	1.06	1.06	1.00	1.06	1.21	1.19	1.12	-6.2%	1.8%	3.2%
Europe	5.01	4.82	5.64	6.09	5.85	6.09	6.03	5.40	5.86	6.44	5.25	-18.4%	0.4%	14.9%
CIS	0.52	0.37	0.59	0.53	0.56	0.56	0.53	0.48	0.56	0.61	0.65	7.9%	-1.2%	1.9%
Middle East	0.40	0.35	0.43	0.49	0.44	0.49	0.38	0.34	0.35	0.35	0.32	-7.1%	-4.2%	0.9%
Africa	0.27	0.32	0.35	0.31	0.83	0.39	0.47	0.50	0.73	0.64	0.64	-12.0%	7.8%	1.5%
China	3.28	4.45	5.20	6.71	7.63	6.62	4.69	5.65	5.87	6.13	6.40	4.3%	19.4%	18.1%
India	1.80	2.00	2.37	3.09	3.66	4.65	4.92	6.46	5.15	5.28	5.69	7.9%	14.1%	16.1%
Japan	4.22	4.84	4.61	4.87	5.06	5.00	5.05	5.01	5.06	5.01	4.90	-2.2%	—	13.9%
South Korea	2.69	3.11	3.38	3.30	3.32	3.43	3.54	3.53	3.89	3.92	3.73	-4.7%	4.0%	10.6%
Other Asia Pacific	2.79	3.18	3.29	3.65	3.61	2.73	3.96	4.60	5.00	5.37	5.96	10.9%	6.0%	16.9%
Total World	22.75	25.39	27.66	30.62	32.66	31.78	31.29	33.70	34.29	35.74	35.28	-1.3%	4.2%	100.0%
Exports														
Canada	0.72	0.92	1.03	0.99	1.13	1.00	0.86	0.78	0.94	1.04	1.03	-0.3%	2.9%	2.9%
US	1.46	2.02	2.51	3.02	2.89	2.38	1.90	1.53	2.40	2.89	2.39	-17.5%	3.4%	6.8%
Colombia	1.63	1.78	2.02	2.25	2.05	2.27	2.19	2.33	2.48	2.43	2.10	-13.5%	2.1%	5.9%
Europe	0.23	0.12	0.16	0.20	0.68	0.13	0.10	0.13	0.19	0.25	0.23	-8.3%	0.1%	0.7%
Russia	2.45	2.50	2.86	3.23	3.55	3.78	4.11	4.47	5.09	5.78	5.87	1.5%	9.4%	16.6%
Other CIS	0.50	0.35	0.58	0.50	0.51	0.51	0.48	0.45	0.47	0.51	0.54	5.9%	-2.3%	1.5%
South Africa	1.93	1.98	2.04	2.22	2.10	2.18	2.30	2.16	2.52	2.33	2.20	-5.8%	2.9%	6.2%
Other Africa	0.03	0.11	0.04	0.13	0.12	0.19	0.28	2.02	0.65	0.22	0.28	27.7%	21.5%	0.8%
Australia	6.99	7.46	7.04	7.96	9.19	9.12	9.95	9.87	9.70	9.78	9.69	-0.9%	4.1%	27.5%
China	0.59	0.59	0.44	0.28	0.28	0.36	0.45	0.51	0.42	0.42	0.34	-18.0%	-12.3%	1.0%
Indonesia	5.07	6.20	7.18	8.16	8.57	8.42	7.48	7.73	8.08	8.56	9.18	7.2%	6.4%	26.0%
Mongolia	0.17	0.48	0.58	0.63	0.49	0.53	0.41	0.73	0.95	0.99	1.02	3.2%	24.0%	2.9%
Other Asia Pacific	0.82	0.76	1.01	0.90	0.92	0.77	0.65	0.77	0.30	0.39	0.29	-26.3%	-5.0%	0.8%
Rest of World	0.15	0.13	0.16	0.15	0.19	0.14	0.14	0.22	0.12	0.15	0.13	-13.9%	-3.6%	0.4%
Total World	22.75	25.39	27.66	30.62	32.66	31.78	31.29	33.70	34.29	35.74	35.28	-1.3%	4.2%	100.0%

*Less than 0.05%.

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

Coal: Inter-area movements 2019

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

†Less than 0.005.

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

Nuclear energy

Consumption*

Exajoules (input-equivalent)												Growth rate per annum			
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019	2008-18	Share 2019	
Canada	0.84	0.85	0.87	0.87	0.95	0.98	0.92	0.91	0.91	0.90	0.90	0.1%	-0.1%	3.6%	
Mexico	0.10	0.06	0.09	0.08	0.11	0.09	0.11	0.10	0.10	0.12	0.10	-17.9%	2.7%	0.4%	
US	7.94	7.97	7.76	7.51	7.66	7.69	7.64	7.68	7.63	7.60	7.60	-0.1%	-0.6%	30.5%	
Total North America	8.89	8.87	8.72	8.46	8.71	8.75	8.67	8.69	8.63	8.62	8.59	-0.3%	-0.5%	34.5%	
Argentina	0.08	0.07	0.06	0.06	0.06	0.05	0.06	0.08	0.05	0.06	0.06	0.08	-1.3%	0.3%	
Brazil	0.12	0.14	0.15	0.15	0.14	0.14	0.13	0.14	0.14	0.14	0.14	2.8%	0.6%	0.6%	
Chile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Colombia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ecuador	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Peru	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Trinidad & Tobago	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Venezuela	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Other S. & Cent. America	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	-	
Total S. & Cent. America	0.20	0.20	0.21	0.21	0.20	0.19	0.20	0.22	0.20	0.20	0.22	8.7%	-0.1%	0.9%	
Austria	0.45	0.45	0.45	0.37	0.39	0.31	0.24	0.39	0.38	0.26	0.26	0.39	52.4%	-5.1%	1.6%
Belgium	0.26	0.26	0.26	0.28	0.28	0.28	0.24	0.22	0.26	0.27	0.27	0.27	0.7%	0.6%	1.1%
Czech Republic	0.22	0.22	0.22	0.22	0.22	0.22	0.21	0.21	0.20	0.20	0.20	0.20	4.4%	-1.2%	0.8%
Finland	3.87	4.02	4.13	3.94	3.91	4.00	3.98	3.65	3.59	3.70	3.56	-3.8%	-1.2%	14.3%	
France	1.27	1.32	1.01	0.92	0.90	0.89	0.84	0.77	0.69	0.68	0.67	-1.6%	-7.1%	2.7%	
Germany	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Greece	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Hungary	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.15	0.14	0.14	0.15	3.2%	-	0.6%	
Italy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Netherlands	0.04	0.04	0.04	0.04	0.03	0.04	0.04	0.04	0.03	0.03	0.03	10.8%	-2.3%	0.1%	
Norway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Poland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Portugal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Romania	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.10	0.10	0.10	0.10	-1.2%	-0.5%	0.4%	
Spain	0.50	0.58	0.54	0.57	0.52	0.53	0.52	0.53	0.52	0.50	0.52	4.4%	-1.2%	2.1%	
Sweden	0.49	0.54	0.56	0.59	0.61	0.59	0.51	0.57	0.59	0.61	0.60	-2.6%	0.1%	2.4%	
Switzerland	0.26	0.25	0.25	0.24	0.24	0.25	0.21	0.19	0.18	0.22	0.21	-6.0%	-1.8%	0.8%	
Turkey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ukraine	0.78	0.84	0.84	0.84	0.77	0.81	0.80	0.73	0.77	0.76	0.74	-2.0%	-1.2%	3.0%	
United Kingdom	0.65	0.58	0.64	0.65	0.65	0.58	0.64	0.65	0.63	0.58	0.50	-14.0%	1.6%	2.0%	
Other Europe	0.43	0.33	0.35	0.34	0.32	0.35	0.33	0.33	0.33	0.33	0.34	2.7%	-3.3%	1.4%	
Total Europe	9.49	9.69	9.55	9.26	9.09	9.09	8.82	8.53	8.43	8.37	8.28	-1.2%	-1.8%	33.2%	
Azerbaijan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Belarus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Kazakhstan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Russian Federation	1.54	1.60	1.61	1.65	1.59	1.66	1.78	1.78	1.83	1.82	1.86	1.8%	1.7%	7.5%	
Turkmenistan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Uzbekistan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Other CIS	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	5.5%	-2.3%	0.1%	
Total CIS	1.57	1.62	1.64	1.67	1.61	1.68	1.81	1.80	1.85	1.85	1.88	1.8%	1.6%	7.6%	
Iran	-	-	-	†	0.01	0.04	0.04	0.03	0.06	0.06	0.06	0.06	-7.2%	-	0.2%
Iraq	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Israel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Kuwait	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Oman	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Qatar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Saudi Arabia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
United Arab Emirates	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Other Middle East	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	-	
Total Middle East	-	-	†	0.01	0.04	0.04	0.03	0.06	0.06	0.06	0.06	-7.2%	n/a	0.2%	
Algeria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Egypt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Morocco	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
South Africa	0.12	0.13	0.12	0.12	0.13	0.13	0.11	0.14	0.14	0.10	0.13	27.7%	-2.2%	0.5%	
Other Africa	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	-	
Total Africa	0.12	0.13	0.12	0.12	0.13	0.13	0.11	0.14	0.14	0.10	0.13	27.7%	-2.2%	0.5%	
Australia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Bangladesh	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
China	0.66	0.70	0.81	0.91	1.03	1.22	1.56	1.93	2.23	2.64	3.11	17.8%	15.0%	12.5%	
China Hong Kong SAR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
India	0.16	0.22	0.30	0.31	0.31	0.32	0.35	0.34	0.34	0.35	0.40	15.2%	9.2%	1.6%	
Indonesia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Japan	2.59	2.74	1.52	0.17	0.13	-	0.04	0.16	0.26	0.44	0.59	33.2%	-15.6%	2.3%	
Malaysia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
New Zealand	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Pakistan	0.02	0.02	0.04	0.03	0.07	0.04	0.04	0.05	0.07	0.09	0.08	-3.2%	18.1%	0.3%	
Philippines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Singapore	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
South Korea	1.40	1.39	1.44	1.39	1.28	1.43	1.50	1.47	1.34	1.19	1.30	8.9%	-1.8%	5.2%	
Sri Lanka	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Taiwan	0.39	0.39	0.39	0.37	0.38	0.39	0.33	0.29	0.20	0.25	0.29	16.3%	-4.4%	1.2%	
Thailand	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Vietnam	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Other Asia Pacific	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	-	
Total Asia Pacific	5.23	5.47	4.51	3.18	3.20	3.40	3.82	4.24	4.44	4.96	5.77	16.4%	-0.1%	23.2%	
Total World	25.49	25.99	24.75	22.91	22.98	23.28	23.46	23.67	23.75	24.16	24.92	3.2%	-0.7%	100.0%	
of which: OECD	21.33	21.61	20.14	18.19	18.21	18.22	17.98	17.96	17.64	17.62	17.77	0.8%	-2.1%	71.3%	
Non-OECD	4.16	4.38	4.61	4.72	4.77	5.06	5.47	5.81	6.11	6.54	7.16	9.5%	4.5%	28.7%	
European Union	8.45	8.60	8.46	8.18	8.08	8.03	7.81	7.60	7.47	7.40	7.33	-0.9%	-1.8%	29.4%	

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

†Less than 0.05%.

‡Less than 0.05%.

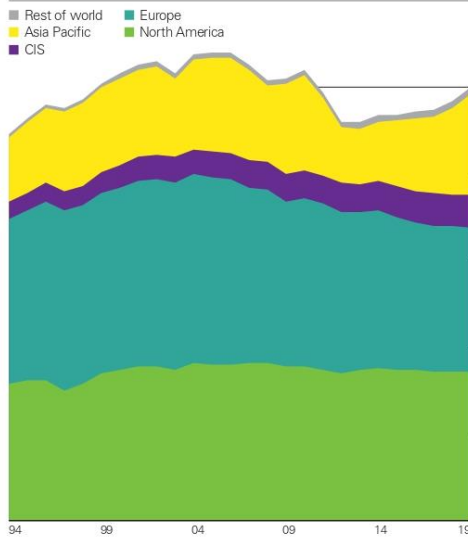
Nuclear data expressed in terawatt-hours is available at [bp.com/statisticalreview](https://www.bp.com/statisticalreview).

Consumption*

Exajoules (input-equivalent)												Growth rate per annum		Share 2019
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019	2008-18	
Canada	3.48	3.30	3.51	3.53	3.61	3.50	3.48	3.49	3.55	3.45	3.41	-1.4%	-0.4%	9.0%
Mexico	0.25	0.35	0.34	0.30	0.26	0.36	0.28	0.28	0.29	0.29	0.21	-27.0%	-2.5%	0.6%
US	2.56	2.41	2.95	2.54	2.46	2.34	2.24	2.39	2.67	2.59	2.42	-6.7%	0.8%	6.4%
Total North America	6.30	6.06	6.79	6.36	6.33	6.20	6.01	6.16	6.51	6.33	6.03	-4.7%	*	16.0%
Argentina	0.39	0.38	0.37	0.34	0.38	0.37	0.38	0.35	0.37	0.37	0.33	-11.3%	0.5%	0.9%
Brazil	3.69	3.79	4.00	3.85	3.60	3.42	3.28	3.45	3.34	3.48	3.56	2.3%	-0.1%	9.5%
Chile	0.24	0.20	0.19	0.19	0.18	0.21	0.22	0.18	0.19	0.21	0.19	-11.1%	-1.0%	0.5%
Colombia	0.39	0.38	0.45	0.44	0.41	0.41	0.41	0.42	0.52	0.51	0.46	-9.3%	1.5%	1.2%
Ecuador	0.09	0.08	0.10	0.11	0.10	0.10	0.12	0.14	0.18	0.19	0.22	18.8%	5.6%	0.6%
Peru	0.19	0.19	0.20	0.20	0.21	0.20	0.22	0.22	0.26	0.28	0.28	2.4%	4.3%	0.7%
Trinidad & Tobago	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Venezuela	0.81	0.72	0.78	0.76	0.77	0.72	0.67	0.56	0.53	0.51	0.56	10.6%	-4.7%	1.5%
Other S. & Cent. America	0.80	0.84	0.85	0.87	0.90	0.84	0.83	0.90	0.91	0.89	0.77	-13.2%	0.8%	2.0%
Total S. & Cent. America	6.59	6.58	6.94	6.77	6.54	6.29	6.12	6.21	6.30	6.43	6.37	-0.9%	-0.1%	16.9%
Austria	0.39	0.36	0.32	0.41	0.39	0.38	0.34	0.36	0.34	0.34	0.36	7.8%	-0.8%	1.0%
Belgium	†	†	†	†	†	†	†	†	†	†	†	-5.8%	-3.2%	†
Czech Republic	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.02	0.01	0.01	0.02	-22.8%	-2.7%	†
Finland	0.12	0.12	0.12	0.16	0.12	0.12	0.15	0.14	0.13	0.12	0.11	-6.8%	-5.2%	0.3%
France	0.54	0.59	0.42	0.54	0.65	0.58	0.50	0.54	0.44	0.57	0.52	-8.8%	-0.6%	1.4%
Germany	0.18	0.20	0.16	0.20	0.21	0.18	0.17	0.19	0.18	0.16	0.18	11.9%	-1.9%	0.5%
Greece	0.05	0.07	0.04	0.04	0.06	0.04	0.06	0.05	0.04	0.05	0.04	-30.5%	5.0%	0.1%
Hungary	†	†	†	†	†	†	†	†	†	†	†	-1.3%	-0.2%	†
Italy	0.46	0.48	0.43	0.39	0.49	0.54	0.40	0.37	0.31	0.42	0.40	-4.5%	0.6%	1.1%
Netherlands	†	†	†	†	†	†	†	†	†	†	†	2.2%	-3.8%	†
Norway	1.18	1.10	1.12	1.31	1.18	1.24	1.25	1.29	1.28	1.24	1.12	-10.2%	-0.6%	3.0%
Poland	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-1.2%	-1.5%	-
Portugal	0.08	0.15	0.11	0.05	0.13	0.14	0.08	0.14	0.05	0.11	0.08	-29.7%	5.5%	0.2%
Romania	0.15	0.19	0.14	0.11	0.14	0.17	0.15	0.16	0.13	0.16	0.14	-13.0%	-0.3%	0.4%
Spain	0.25	0.39	0.29	0.19	0.34	0.36	0.26	0.33	0.17	0.31	0.22	-27.7%	3.4%	0.6%
Sweden	0.62	0.62	0.63	0.73	0.57	0.58	0.69	0.56	0.58	0.56	0.59	5.5%	-1.7%	1.6%
Switzerland	0.34	0.34	0.30	0.36	0.35	0.35	0.35	0.31	0.31	0.31	0.31	-0.1%	-1.0%	0.8%
Turkey	0.34	0.49	0.49	0.54	0.55	0.37	0.61	0.61	0.52	0.54	0.79	48.2%	5.4%	2.1%
Ukraine	0.11	0.12	0.10	0.10	0.13	0.08	0.05	0.07	0.08	0.09	0.06	-34.7%	-1.6%	0.2%
United Kingdom	0.05	0.03	0.05	0.05	0.04	0.05	0.06	0.05	0.05	0.05	0.05	8.6%	†	0.1%
Other Europe	0.67	0.79	0.56	0.58	0.71	0.68	0.65	0.67	0.59	0.71	0.62	-11.9%	1.8%	1.7%
Total Europe	5.57	6.10	5.31	5.80	6.10	5.90	5.79	5.90	5.26	5.77	5.64	-2.3%	0.2%	15.0%
Azerbaijan	0.02	0.03	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.01	-11.8%	-2.9%	†
Belarus	†	†	†	†	†	†	†	†	†	†	†	-0.4%	22.8%	†
Kazakhstan	0.06	0.09	0.07	0.07	0.07	0.08	0.09	0.11	0.10	0.09	0.09	-4.1%	2.7%	0.2%
Russian Federation	1.65	1.56	1.52	1.52	1.67	1.59	1.53	1.67	1.67	1.71	1.73	1.6%	0.9%	4.6%
Turkmenistan	†	†	†	†	†	†	†	†	†	†	†	-0.4%	-0.6%	†
Uzbekistan	0.06	0.08	0.05	0.06	0.06	0.06	0.05	0.07	0.08	0.05	0.06	9.8%	2.4%	0.2%
Other CIS	0.27	0.29	0.31	0.31	0.30	0.29	0.28	0.28	0.31	0.32	0.32	0.5%	1.5%	0.8%
Total CIS	2.06	2.04	1.98	1.98	2.11	2.03	1.96	2.14	2.17	2.19	2.21	1.3%	1.0%	5.9%
Iran	0.06	0.10	0.10	0.12	0.13	0.13	0.12	0.14	0.16	0.10	0.26	153.3%	3.7%	0.7%
Iraq	0.03	0.03	0.03	0.04	0.04	0.03	0.02	0.03	0.02	0.02	0.02	35.8%	-5.2%	0.1%
Israel	†	†	†	†	†	†	†	†	†	†	†	-0.4%	3.1%	†
Kuwait	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oman	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Qatar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saudi Arabia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
United Arab Emirates	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Middle East	0.02	0.03	0.04	0.04	0.04	0.02	0.01	0.01	0.01	0.01	0.02	43.4%	-9.6%	†
Total Middle East	0.11	0.16	0.17	0.20	0.22	0.18	0.15	0.18	0.19	0.13	0.30	128.7%	*	0.8%
Algeria	†	†	†	†	†	†	†	†	†	†	†	29.0%	-9.0%	†
Egypt	0.13	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	-0.2%	-1.8%	0.3%
Morocco	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.01	0.01	0.02	0.01	-25.7%	5.7%	†
South Africa	0.01	0.01	0.03	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	-0.4%	-5.5%	†
Other Africa	0.77	0.84	0.86	0.88	0.93	0.98	0.94	0.91	0.98	1.02	1.04	2.0%	3.1%	2.8%
Total Africa	0.94	1.01	1.03	1.03	1.08	1.13	1.09	1.05	1.11	1.17	1.18	1.4%	2.4%	3.1%
Australia	0.12	0.13	0.18	0.16	0.18	0.13	0.13	0.16	0.12	0.16	0.13	-17.9%	3.3%	0.3%
Bangladesh	†	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-5.2%	-1.5%	†
China	5.81	6.68	6.42	8.00	8.38	9.71	10.15	10.44	10.49	10.73	11.32	5.5%	5.9%	30.1%
China Hong Kong SAR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
India	1.00	1.02	1.23	1.07	1.22	1.27	1.21	1.16	1.22	1.25	1.44	15.5%	1.3%	3.8%
Indonesia	0.11	0.16	0.12	0.12	0.16	0.14	0.13	0.17	0.17	0.15	0.15	0.6%	3.2%	0.4%
Japan	0.67	0.83	0.77	0.71	0.73	0.75	0.78	0.67	0.71	0.72	0.66	-9.1%	0.1%	1.8%
Malaysia	0.07	0.06	0.08	0.09	0.11	0.12	0.13	0.18	0.24	0.24	0.24	1.8%	12.3%	0.6%
New Zealand	0.23	0.23	0.23	0.21	0.21	0.22	0.22	0.23	0.23	0.24	0.23	-3.0%	1.0%	0.6%
Pakistan	0.27	0.28	0.29	0.10	0.46	0.30	0.30	0.31	0.28	0.26	0.32	21.8%	†	0.8%
Philippines	0.09	0.07	0.09	0.10	0.09	0.08	0.08	0.07	0.09	0.08	0.09	2.5%	-1.1%	0.2%
Singapore	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Korea	0.03	0.03	0.04	0.04	0.04	0.03	0.02	0.03	0.03	0.03	0.02	-17.7%	0.3%	0.1%
Sri Lanka	0.04	0.05	0.04	0.03	0.06	0.04	0.05	0.04	0.04	0.06	0.04	-25.1%	3.9%	0.1%
Taiwan	0.04	0.04	0.04	0.05	0.05	0.04	0.04	0.06	0.05	0.04	0.05	23.8%	-0.2%	0.1%
Thailand	0.07	0.05	0.07	0.08	0.05	0.05	0.03	0.03	0.04	0.07	0.06	-17.2%	0.3%	0.1%
Vietnam	0.28	0.27	0.38	0.49	0.53	0.57	0.52	0.60	0.80	0.76	0.58	-22.7%	11.8%	1.6%
Other Asia Pacific	0.32	0.39	0.44	0.44	0.49	0.49	0.45	0.53	0.55	0.53	0.56	7.2%	4.9%	1.5%
Total Asia Pacific	9.14	10.30	10.43	11.70	12.77	13.94	14.26	14.69	15.05	15.31	15.90	3.9%	4.9%	42.2%
Total World														

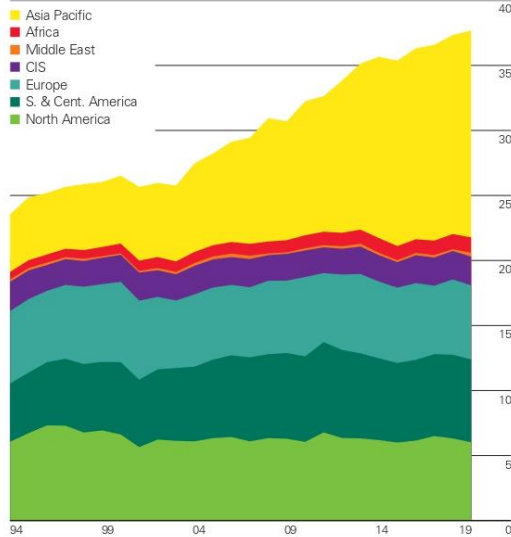
Nuclear energy consumption by region

Exajoules



Hydroelectricity consumption by region

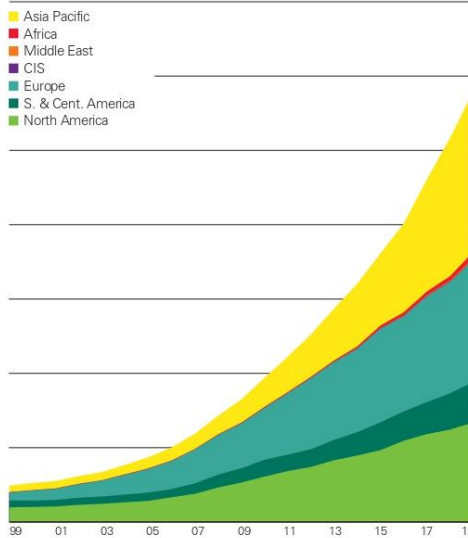
Exajoules



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

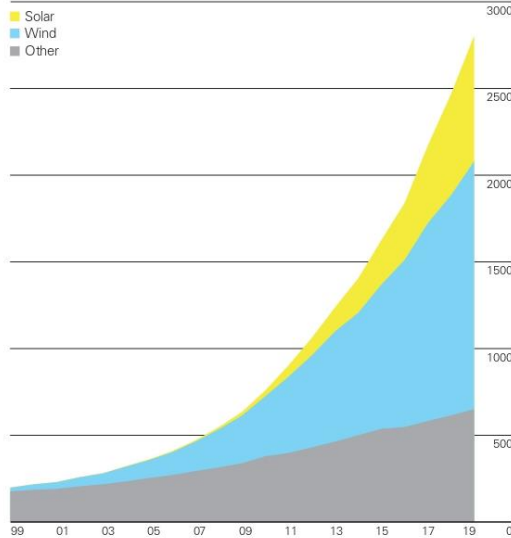
Renewables consumption by region

Exajoules



Renewables generation by source

Terawatt-hours



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

Renewable energy

Renewables consumption*

Exajoules (input-equivalent)											Growth rate per annum		Share 2019	
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019		2008-18
Canada	0.18	0.22	0.25	0.28	0.29	0.30	0.44	0.49	0.49	0.50	0.52	4.0%	13.5%	1.8%
Mexico	0.08	0.09	0.09	0.10	0.11	0.13	0.16	0.17	0.18	0.22	0.35	59.5%	10.3%	1.2%
US	2.39	2.76	3.09	3.33	3.76	4.04	4.25	4.81	5.24	5.50	5.83	5.9%	10.1%	20.1%
Total North America	2.66	3.06	3.43	3.71	4.16	4.48	4.84	5.47	5.92	6.22	6.70	7.6%	10.3%	23.1%
Argentina	0.02	0.04	0.05	0.07	0.07	0.08	0.08	0.08	0.09	0.10	0.14	38.3%	19.8%	0.5%
Brazil	0.79	0.92	0.88	0.90	1.05	1.22	1.45	1.49	1.63	1.83	2.02	10.4%	9.9%	7.0%
Chile	0.03	0.04	0.04	0.06	0.07	0.06	0.08	0.11	0.13	0.16	0.19	20.4%	16.6%	0.7%
Colombia	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	1.7%	13.7%	0.1%
Ecuador	+	+	+	+	+	+	+	+	+	+	0.01	26.9%	11.1%	•
Peru	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.05	0.05	10.6%	18.6%	0.2%
Trinidad & Tobago	+	+	+	+	+	+	+	+	+	+	+	-0.4%	-15.3%	•
Venezuela	-	+	+	+	+	+	+	+	+	+	+	1688.5%	-	•
Other S. & Cent. America	0.09	0.10	0.11	0.13	0.14	0.16	0.20	0.23	0.24	0.27	0.29	7.1%	12.6%	1.0%
Total S. & Cent. America	0.96	1.13	1.11	1.19	1.37	1.57	1.87	1.97	2.15	2.44	2.73	11.9%	10.9%	9.4%
Austria	0.08	0.08	0.08	0.09	0.10	0.11	0.12	0.12	0.14	0.13	0.14	8.4%	5.4%	0.5%
Belgium	0.05	0.07	0.09	0.11	0.12	0.13	0.14	0.14	0.16	0.17	0.19	8.9%	16.2%	0.6%
Czech Republic	0.03	0.04	0.06	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	2.7%	14.7%	0.3%
Finland	0.09	0.11	0.12	0.12	0.13	0.14	0.14	0.14	0.16	0.18	0.18	0.8%	5.4%	0.6%
France	0.22	0.24	0.28	0.33	0.35	0.38	0.44	0.46	0.49	0.54	0.61	13.9%	10.9%	2.1%
Germany	0.83	0.91	1.11	1.25	1.31	1.43	1.66	1.64	1.88	1.97	2.12	7.5%	9.3%	7.3%
Greece	0.03	0.03	0.04	0.06	0.08	0.08	0.09	0.09	0.10	0.10	0.11	10.0%	14.4%	0.4%
Hungary	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	14.4%	3.8%	0.2%
Italy	0.24	0.30	0.40	0.53	0.60	0.61	0.63	0.65	0.67	0.64	0.64	-1.4%	13.2%	2.2%
Netherlands	0.12	0.11	0.13	0.13	0.13	0.12	0.14	0.14	0.17	0.19	0.23	17.7%	6.7%	0.8%
Norway	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.05	0.05	0.07	27.6%	13.0%	0.2%
Poland	0.09	0.10	0.13	0.17	0.17	0.19	0.22	0.21	0.22	0.21	0.25	15.2%	13.4%	0.9%
Portugal	0.10	0.13	0.13	0.14	0.16	0.16	0.16	0.16	0.16	0.16	0.18	8.0%	7.4%	0.6%
Romania	0.01	0.01	0.02	0.03	0.05	0.07	0.09	0.09	0.10	0.09	0.10	8.2%	34.1%	0.3%
Spain	0.46	0.57	0.59	0.70	0.72	0.69	0.67	0.66	0.68	0.70	0.75	7.3%	6.3%	2.6%
Sweden	0.14	0.17	0.19	0.21	0.22	0.24	0.29	0.30	0.32	0.32	0.36	13.4%	9.3%	1.2%
Switzerland	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.04	7.0%	12.9%	0.2%
Turkey	0.02	0.04	0.05	0.07	0.11	0.12	0.15	0.21	0.27	0.34	0.41	19.3%	40.4%	1.4%
Ukraine	+	+	+	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.05	92.4%	23.5%	0.2%
United Kingdom	0.23	0.26	0.32	0.37	0.49	0.59	0.74	0.74	0.88	0.99	1.08	9.1%	17.8%	3.7%
Other Europe	0.20	0.24	0.29	0.33	0.36	0.39	0.43	0.43	0.49	0.51	0.56	9.7%	10.6%	1.9%
Total Europe	3.01	3.49	4.12	4.78	5.24	5.62	6.30	6.40	7.12	7.50	8.18	9.2%	10.9%	28.2%
Azerbaijan	+	+	-	-	+	+	+	+	+	+	+	27.7%	-	•
Belarus	+	+	+	+	+	+	+	+	+	+	+	3.2%	19.6%	•
Kazakhstan	+	+	+	+	+	+	+	+	+	+	0.01	47.3%	-	•
Russian Federation	+	0.01	0.01	+	+	0.01	0.01	0.01	0.01	0.01	0.02	31.0%	10.2%	0.1%
Turkmenistan	-	+	+	+	+	+	+	+	+	+	+	-0.4%	-	•
Uzbekistan	-	-	-	-	-	-	-	+	+	+	+	132.5%	-	•
Other CIS	+	+	+	+	+	+	+	+	+	+	+	16.5%	39.8%	•
Total CIS	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03	29.4%	15.9%	0.1%
Iran	+	+	+	+	+	+	+	+	+	+	+	12.1%	9.0%	•
Iraq	-	-	-	-	+	+	+	+	+	+	+	-0.4%	-	•
Israel	+	+	+	+	0.01	0.01	0.01	0.02	0.02	0.02	0.03	64.3%	40.9%	0.1%
Kuwait	-	-	-	-	+	+	+	+	+	+	+	91.4%	-	•
Oman	-	-	-	-	+	+	+	+	+	+	+	-0.4%	-	•
Qatar	-	-	-	-	+	+	+	+	+	+	+	-0.4%	-	•
Saudi Arabia	+	+	+	+	+	+	+	+	+	+	0.02	365.6%	89.2%	0.1%
United Arab Emirates	+	+	+	+	+	+	+	+	0.01	0.01	0.04	214.8%	-	0.1%
Other Middle East	+	+	+	+	+	+	+	0.01	0.02	0.03	0.03	8.9%	68.3%	0.1%
Total Middle East	+	+	0.01	0.01	0.01	0.02	0.02	0.04	0.05	0.07	0.12	77.1%	38.8%	0.4%
Algeria	-	+	+	+	+	+	+	+	+	0.01	0.01	1.6%	-	•
Egypt	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.03	0.06	82.0%	13.6%	0.2%
Morocco	+	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.04	0.06	30.6%	31.2%	0.2%
South Africa	+	+	+	0.01	0.01	0.02	0.06	0.07	0.10	0.11	0.12	3.1%	37.2%	0.4%
Other Africa	0.03	0.04	0.04	0.04	0.05	0.06	0.08	0.08	0.09	0.10	0.17	72.6%	13.5%	0.6%
Total Africa	0.05	0.06	0.06	0.07	0.08	0.12	0.18	0.21	0.25	0.29	0.41	39.3%	20.7%	1.4%
Australia	0.12	0.15	0.18	0.19	0.21	0.23	0.25	0.26	0.28	0.35	0.42	22.0%	13.1%	1.5%
Bangladesh	+	+	+	+	+	+	+	+	+	+	+	39.0%	32.1%	•
China	0.52	0.77	1.05	1.36	1.80	2.24	2.62	3.44	4.61	5.81	6.63	14.2%	33.4%	22.9%
China Hong Kong SAR	+	+	+	+	+	+	+	+	+	+	+	13.4%	64.1%	•
India	0.27	0.32	0.39	0.46	0.52	0.58	0.60	0.73	0.90	1.10	1.21	9.4%	17.1%	4.2%
Indonesia	0.09	0.10	0.10	0.11	0.12	0.15	0.12	0.20	0.20	0.25	0.39	54.2%	12.2%	1.4%
Japan	0.25	0.29	0.30	0.33	0.39	0.49	0.64	0.63	0.76	0.89	1.10	24.1%	13.3%	3.8%
Malaysia	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	12.5%	11.5%	0.1%
New Zealand	0.07	0.08	0.08	0.08	0.08	0.09	0.10	0.10	0.10	0.09	0.10	2.4%	5.5%	0.3%
Pakistan	+	+	+	+	+	+	0.01	0.02	0.03	0.04	0.06	33.0%	123.2%	0.2%
Philippines	0.11	0.10	0.10	0.11	0.11	0.11	0.13	0.15	0.14	0.15	0.15	2.7%	3.4%	0.5%
Singapore	+	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	5.5%	5.0%	•
South Korea	0.03	0.05	0.05	0.05	0.07	0.09	0.12	0.15	0.19	0.24	0.29	19.3%	27.2%	1.0%
Sri Lanka	+	+	+	+	+	+	+	+	0.01	0.01	0.01	7.0%	47.0%	•
Taiwan	0.02	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.06	0.07	24.9%	9.6%	0.2%
Thailand	0.05	0.06	0.07	0.09	0.12	0.15	0.16	0.18	0.21	0.24	0.29	18.8%	19.5%	1.0%
Vietnam	+	+	+	+	+	+	+	+	+	+	+	845.8%	23.6%	0.1%
Other Asia Pacific	+	+	+	+	+	+	0.01	0.01	0.01	0.01	0.01	30.6%	25.3%	•
Total Asia Pacific	1.56	1.95	2.38	2.84	3.49	4.21	4.85	5.96	7.53	9.29	10.81	16.5%	22.2%	37.3%
Total World	8.24	9.70	11.12	12.60	14.36	16.03	18.08	20.06	23.04	25.83	28.98	12.2%	13.7%	100.0%
of which: OECD	6.16	7.12	8.16	9.13	10.12	10.94	12.18	12.96	14.32	15.27	16.77	9.8%	10.9%	57.9%
Non-OECD	2.08	2.58	2.96	3.47	4.24	5.09	5.90	7.10	8.71	10.55	12.21	15.7%	19.9%	42.1%
European Union	2.92	3.38	3.98	4.62	5.02	5.38	6.02	6.05	6.69	6.97	7.54	8.2%	10.5%	26.0%

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

†Less than 0.05%.

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

Other renewables data expressed in terawatt-hours is available at bp.com/statisticalreview.

Renewables: Renewable power generation*

Terawatt-hours											Growth rate per annum			Share 2019
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019	2008-18	
Canada	15.7	19.3	21.0	23.1	23.7	24.7	39.8	45.6	45.9	47.1	49.3	4.7%	14.8%	1.8%
Mexico	8.2	8.7	9.1	10.5	11.6	13.8	16.4	18.0	19.5	23.3	37.8	62.4%	11.0%	1.3%
US	149.9	173.7	201.9	228.3	266.2	296.8	315.8	367.4	417.7	451.6	489.8	8.5%	13.2%	17.5%
Total North America	173.7	201.7	231.9	261.9	301.5	335.3	372.1	431.0	483.2	522.0	576.9	10.5%	13.2%	20.6%
Argentina	1.8	2.0	2.2	2.8	2.9	2.9	3.0	2.5	3.0	4.0	8.2	104.2%	8.7%	0.3%
Brazil	24.1	34.1	35.3	40.8	47.6	59.3	71.6	84.9	96.1	106.3	117.7	10.7%	17.6%	4.2%
Chile	3.5	3.7	4.7	6.4	7.4	6.9	9.0	11.7	15.0	17.9	21.6	20.9%	17.3%	0.8%
Colombia	1.1	1.1	1.4	1.5	1.4	1.8	1.9	2.0	2.0	2.2	2.2	-2.0%	14.5%	0.1%
Ecuador	0.2	0.2	0.3	0.3	0.4	0.5	0.5	0.6	0.5	0.5	0.7	29.4%	10.0%	•
Peru	0.5	0.7	0.7	0.7	1.2	1.7	1.7	1.9	2.4	3.5	4.0	15.2%	22.4%	0.1%
Trinidad & Tobago	†	†	†	†	†	†	†	†	†	†	†	-	-14.8%	•
Venezuela	-	†	†	†	†	†	†	†	†	†	0.2	1695.2%	-	•
Other S. & Cent. America	8.1	9.1	9.6	11.7	13.1	15.7	19.7	22.4	23.8	27.5	29.6	7.7%	14.2%	1.1%
Total S. & Cent. America	39.2	51.0	54.2	64.3	74.0	88.9	107.5	126.2	142.8	161.9	184.1	13.7%	16.6%	6.6%
Austria	6.3	6.6	6.6	7.4	8.4	9.0	10.3	11.0	12.8	12.3	13.6	10.2%	6.9%	0.5%
Belgium	5.1	6.2	8.2	10.1	11.3	12.0	14.2	14.0	15.6	16.8	18.6	10.5%	15.4%	0.7%
Czech Republic	2.2	3.1	5.2	6.0	6.5	7.3	7.6	7.7	7.8	7.9	7.9	1.7%	16.3%	0.3%
Finland	9.0	11.3	11.7	11.6	12.7	12.9	13.7	14.5	16.1	18.1	18.4	1.4%	5.4%	0.7%
France	12.7	15.5	19.6	24.3	26.2	29.0	35.0	37.2	41.5	46.9	54.9	17.0%	16.5%	2.0%
Germany	76.1	84.2	106.4	121.3	129.3	142.9	169.8	169.1	196.2	206.8	224.1	8.4%	11.0%	8.0%
Greece	2.8	3.1	4.1	5.7	8.0	7.7	8.8	9.4	9.8	10.4	11.6	11.1%	15.6%	0.4%
Hungary	2.7	2.8	2.5	2.4	2.6	2.8	3.0	3.0	3.3	3.5	4.3	20.9%	5.1%	0.2%
Italy	20.1	25.8	37.1	50.3	59.2	62.1	63.4	65.6	67.7	65.6	67.6	3.0%	14.8%	2.4%
Netherlands	10.7	11.1	12.3	12.4	12.1	11.6	13.6	14.6	17.4	18.8	22.3	18.4%	7.2%	0.8%
Norway	1.2	1.2	1.6	1.9	2.3	2.5	2.8	2.4	3.1	4.2	5.9	41.9%	12.2%	0.2%
Poland	6.3	8.0	10.8	14.8	14.6	17.7	20.9	20.7	21.6	19.6	23.1	17.6%	16.0%	0.8%
Portugal	10.0	12.2	12.6	13.8	15.7	16.0	15.7	16.5	16.7	17.0	18.6	9.1%	8.0%	0.7%
Romania	†	0.4	1.6	2.9	5.2	6.5	9.6	8.9	9.8	8.5	9.0	5.8%	76.5%	0.3%
Spain	47.4	54.6	55.6	66.4	74.2	71.1	68.9	68.2	69.5	69.8	77.5	11.0%	6.1%	2.8%
Sweden	14.0	15.7	17.6	19.4	21.3	22.0	27.1	27.1	29.9	28.9	33.6	16.1%	6.9%	1.2%
Switzerland	1.3	1.4	1.6	1.9	2.2	2.6	2.8	3.2	3.7	3.9	4.1	6.8%	11.7%	0.1%
Turkey	2.2	3.9	5.8	7.4	9.8	12.0	16.5	23.0	29.0	37.8	45.3	19.8%	41.8%	1.6%
Ukraine	0.2	0.2	0.3	0.8	1.3	1.7	1.7	1.6	1.9	2.5	5.0	100.2%	23.3%	0.2%
United Kingdom	20.0	22.6	29.5	35.9	48.5	58.6	77.1	77.6	92.9	104.5	113.4	8.5%	20.1%	4.0%
Other Europe	20.0	23.6	28.8	32.0	35.3	39.3	43.0	43.4	50.6	52.4	57.9	10.5%	11.0%	2.1%
Total Europe	270.3	313.6	379.5	448.7	506.8	547.2	625.3	638.4	716.7	756.3	836.6	10.6%	12.2%	29.8%
Azerbaijan	†	†	-	-	0.1	0.1	0.1	0.1	0.1	0.2	0.3	28.1%	-	•
Belarus	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	4.3%	25.4%	•
Kazakhstan	-	-	-	†	†	†	†	0.2	0.4	0.5	0.8	49.6%	-	•
Russian Federation	0.5	0.5	0.6	0.5	0.5	0.8	1.0	1.1	1.2	1.4	1.8	31.5%	10.9%	0.1%
Turkmenistan	-	†	†	†	†	†	†	†	†	†	†	-	-	•
Uzbekistan	-	†	-	-	-	-	-	†	†	†	†	133.3%	-	•
Other CIS	†	†	†	†	†	†	†	†	†	0.1	0.1	16.9%	40.6%	•
Total CIS	0.6	0.6	0.7	0.6	0.7	1.0	1.4	1.8	2.1	2.5	3.3	31.1%	16.8%	0.1%
Iran	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.6	12.5%	9.6%	•
Iraq	-	-	-	-	†	0.1	0.1	0.1	0.1	0.1	0.1	-	-	•
Israel	0.1	0.1	0.3	0.5	0.5	0.9	1.2	1.7	1.7	1.7	2.9	65.9%	59.8%	0.1%
Kuwait	-	-	-	-	†	†	†	†	0.1	0.1	0.2	92.2%	-	•
Oman	-	-	-	-	†	†	†	†	†	†	†	-	-	•
Qatar	-	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-	-	•
Saudi Arabia	†	†	†	†	†	†	†	0.1	0.1	0.2	0.4	367.4%	90.4%	0.1%
United Arab Emirates	†	†	†	†	0.1	0.3	0.3	0.3	0.8	1.3	4.2	216.0%	-	0.1%
Other Middle East	†	†	†	†	†	0.1	0.3	1.5	2.2	3.3	3.6	9.3%	69.3%	0.1%
Total Middle East	0.3	0.4	0.7	0.9	1.1	1.8	2.5	4.1	5.5	7.5	13.3	78.0%	41.7%	0.5%
Algeria	-	†	†	†	†	0.1	0.1	0.3	0.5	0.6	0.6	2.0%	-	•
Egypt	1.0	1.4	1.7	1.8	1.6	1.2	1.9	2.6	2.7	3.5	6.5	82.7%	14.3%	0.2%
Morocco	0.4	0.7	0.7	0.7	1.2	1.9	2.5	3.4	3.5	4.8	6.3	31.1%	32.0%	0.2%
South Africa	0.5	0.5	0.5	0.5	0.8	2.6	6.2	7.9	10.6	12.3	12.6	3.0%	37.7%	0.5%
Other Africa	3.3	3.8	3.9	4.5	5.2	6.8	8.8	9.2	9.7	11.0	19.1	73.4%	14.1%	0.7%
Total Africa	5.3	6.3	6.9	7.6	8.8	12.5	19.6	23.5	27.0	32.2	45.1	40.0%	21.3%	1.6%
Australia	7.5	8.4	11.1	13.2	16.4	18.3	21.7	24.2	25.7	32.2	41.1	27.3%	16.0%	1.5%
Bangladesh	†	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	39.5%	32.9%	•
China	48.8	75.0	104.3	136.8	183.8	229.5	279.1	369.5	502.0	636.4	732.3	15.1%	36.6%	26.1%
China Hong Kong SAR	†	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	10.8%	62.0%	•
India	28.0	33.9	41.9	49.5	55.9	63.0	65.1	79.8	99.2	122.8	134.9	9.8%	17.9%	4.8%
Indonesia	9.3	9.4	9.5	9.6	9.5	10.2	10.3	11.0	13.1	14.6	16.0	9.4%	5.7%	0.6%
Japan	26.8	29.7	31.0	34.2	41.2	52.2	68.2	68.1	81.9	96.8	121.2	25.2%	13.7%	4.3%
Malaysia	1.4	1.3	1.5	1.5	1.2	0.9	1.0	1.1	1.1	1.3	1.7	29.3%	5.0%	0.1%
New Zealand	6.9	8.1	8.6	8.8	9.0	10.1	10.8	10.8	10.6	10.5	10.8	2.7%	6.2%	0.4%
Pakistan	†	†	†	0.1	0.5	1.0	1.7	2.8	4.0	5.2	6.9	33.5%	124.5%	0.2%
Philippines	10.4	10.0	10.1	10.5	9.9	10.7	12.3	13.9	13.6	13.9	14.3	2.4%	2.6%	0.5%
Singapore	0.5	0.6	0.6	0.6	0.7	0.8	0.9	0.9	0.9	0.9	1.0	5.9%	5.6%	•
South Korea	2.6	3.3	3.7	4.2	5.7	7.7	11.0	14.0	19.0	23.9	29.2	22.2%	31.7%	1.0%
Sri Lanka	†	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.7	0.8	0.8	7.4%	47.9%	•
Taiwan	2.5	2.9	3.4	3.4	3.8	4.0	4.3	4.5	5.3	6.4	8.0	25.3%	10.2%	0.3%
Thailand	2.3	3.4	4.1	5.2	7.2	9.0	10.0	12.5	14.9	17.8	21.4	20.2%	23.4%	0.8%
Vietnam	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.4	0.5	4.7	849.3%	24.3%	0.2%
Other Asia Pacific	0.1	0.2	0.2	0.2	0.3	0.4	0.6	0.7	0.9	1.1	1.4	31.1%	26.1%	0.1%
Total Asia Pacific	147.3	186.4	230.5	278.4	346.0	418.6	498.2	614.9	793.5	985.5	1146.2	16.3%	23.6%	40.9%
Total World	636.7	760.1	904.5	1062.4	12									

Renewable energy: Generation by source*

Terawatt-hours	2018			2019			2019 Growth rate					
	Wind	Solar	Other renewables†	Total	Wind	Solar	Other renewables†	Total	Wind	Solar	Other renewables†	Total
Canada	33.2	3.9	10.0	47.1	34.2	4.3	10.8	49.3	3.0%	11.9%	7.7%	4.7%
Mexico	13.1	3.2	7.0	23.3	17.6	12.4	7.9	37.8	34.5%	291.2%	10.9%	62.4%
US	275.4	94.3	81.9	451.6	303.1	108.4	78.3	489.8	10.1%	14.9%	-4.4%	8.5%
Total North America	321.7	101.3	98.9	522.0	354.9	125.1	96.9	576.9	10.3%	23.5%	-2.1%	10.5%
Argentina	1.4	0.1	2.5	4.0	5.0	0.8	2.4	8.2	253.6%	639.6%	-3.8%	104.2%
Brazil	48.5	3.5	54.4	106.3	55.8	5.6	56.3	117.7	15.2%	60.7%	-6.3%	10.7%
Chile	3.6	5.1	9.2	17.9	5.3	6.3	10.0	21.6	47.7%	23.1%	9.1%	20.9%
Colombia	0.1	†	2.1	2.2	0.1	0.1	2.0	2.2	7.4%	925.6%	-3.4%	2.0%
Ecuador	0.1	†	0.4	0.5	0.1	0.2	0.5	0.7	6.6%	337.1%	6.3%	29.4%
Peru	1.5	0.7	1.2	3.5	1.6	0.8	1.6	4.0	9.6%	2.2%	29.7%	15.2%
Trinidad & Tobago	-	†	-	†	-	†	-	†	-	-	-	-
Venezuela	-	†	-	†	0.1	†	-	0.2	-	33.0%	-	1695.2%
Other S. & Cent. America	10.6	3.2	13.6	27.5	11.1	3.9	14.6	29.6	4.2%	19.9%	7.4%	7.7%
Total S. & Cent. America	65.8	12.7	83.4	161.9	79.2	17.6	87.4	184.1	20.4%	38.3%	4.7%	13.7%
Austria	6.0	1.4	4.9	12.3	7.4	1.4	4.8	13.6	23.3%	-6.0%	-1.4%	10.2%
Belgium	7.5	3.9	5.5	16.8	9.5	3.9	5.1	18.6	27.7%	1.1%	-6.3%	10.5%
Czech Republic	0.6	2.3	4.8	7.8	0.7	2.3	4.9	7.9	14.9%	-2.5%	2.0%	1.7%
Finland	5.8	0.1	12.2	18.1	6.0	0.2	12.2	18.4	2.5%	97.5%	0.1%	1.4%
France	28.1	10.3	8.5	46.9	34.5	11.7	8.7	54.9	22.8%	13.7%	2.1%	17.0%
Germany	110.0	45.8	51.0	206.8	126.0	47.5	50.6	224.1	14.6%	3.8%	-0.9%	8.4%
Greece	6.3	3.8	0.3	10.4	7.3	4.0	0.3	11.6	15.5%	4.5%	2.2%	11.1%
Hungary	0.6	0.6	2.3	3.5	0.7	1.4	2.1	4.3	19.6%	123.2%	-6.4%	20.9%
Italy	17.7	22.7	25.3	65.6	20.1	24.3	23.2	67.6	13.2%	7.4%	-8.0%	3.0%
Netherlands	10.6	3.7	4.6	18.8	11.5	5.2	5.6	22.3	8.5%	40.5%	23.7%	18.4%
Norway	3.9	0.1	0.2	4.2	5.5	0.1	0.3	5.9	42.8%	32.2%	27.6%	41.9%
Poland	12.8	0.3	6.5	19.6	15.0	0.7	7.3	23.1	17.5%	137.7%	12.2%	17.6%
Portugal	12.6	1.0	3.4	17.0	13.7	1.3	3.5	18.6	8.9%	26.9%	4.8%	9.1%
Romania	6.3	1.9	0.4	8.5	6.7	1.7	0.5	9.0	6.7%	-2.1%	24.6%	5.8%
Spain	50.9	12.7	6.2	69.8	56.2	15.0	6.3	77.5	10.4%	18.0%	1.7%	11.0%
Sweden	16.6	0.4	11.9	28.9	19.9	0.6	13.1	33.6	19.6%	50.1%	10.1%	16.1%
Switzerland	0.1	1.9	1.8	3.9	0.1	2.3	1.8	4.1	-	16.3%	-2.7%	6.9%
Turkey	19.9	7.8	10.1	37.8	21.7	10.9	12.7	45.3	8.8%	40.0%	26.1%	19.8%
Ukraine	1.2	1.1	0.2	2.5	1.9	2.9	0.2	5.0	58.6%	162.8%	9.5%	100.2%
United Kingdom	56.9	12.9	34.6	104.5	64.1	12.7	36.6	113.4	12.7%	-1.4%	5.1%	8.5%
Other Europe	9.6	0.3	0.2	1.1	1.5	0.3	0.2	2.0	139.7%	13.9%	16.1%	86.6%
Total Europe	402.9	138.6	215.0	756.3	461.6	154.7	220.3	836.6	14.6%	11.8%	2.5%	10.6%
Azerbaijan	0.1	†	0.1	0.2	0.1	†	0.1	0.3	63.8%	11.6%	-	28.1%
Belarus	0.1	0.1	0.5	0.7	0.1	0.1	0.1	0.3	7.4%	1.5%	4.5%	4.3%
Kazakhstan	0.4	0.1	†	0.5	0.5	0.3	†	0.8	28.7%	105.8%	110.6%	49.6%
Russian Federation	0.2	0.6	0.5	1.4	0.3	1.0	0.5	1.8	32.7%	57.7%	-0.5%	31.5%
Turkmenistan	-	†	-	†	-	†	-	†	-	-	-	-
Uzbekistan	-	†	-	†	-	†	-	†	-	133.3%	-	133.3%
Other CIS	†	†	†	0.1	†	†	†	0.1	5.6%	64.6%	-	16.9%
Total CIS	0.8	0.9	0.7	2.5	1.1	1.5	0.7	3.3	30.1%	55.8%	0.7%	31.1%
Iran	0.3	0.1	†	0.5	0.4	0.2	†	0.6	7.2%	28.2%	-	12.5%
Iraq	-	0.1	-	0.1	-	0.1	-	0.1	-	-	-	-
Israel	0.1	1.6	0.1	1.7	0.1	2.7	0.1	2.9	-	72.8%	-	65.9%
Kuwait	†	0.1	-	0.1	†	0.1	-	0.2	-	116.7%	-	92.2%
Oman	-	†	-	†	-	†	-	†	-	-	-	-
Qatar	-	†	0.1	0.1	-	†	0.1	0.1	-	-	-	-
Saudi Arabia	-	0.4	-	0.4	-	1.8	-	1.8	-	367.4%	-	367.4%
United Arab Emirates	†	1.3	†	1.3	†	4.2	†	4.2	-	217.2%	-	216.0%
Other Middle East	0.7	2.6	†	3.3	0.7	2.9	†	3.6	-	11.9%	-	9.3%
Total Middle East	1.1	6.1	0.3	7.5	1.2	11.9	0.3	13.3	2.1%	95.4%	-	78.0%
Algeria	†	0.6	-	0.6	†	0.6	-	0.6	-	2.0%	-	2.0%
Egypt	2.0	1.5	-	3.5	2.8	3.7	-	6.5	37.5%	143.4%	-	82.7%
Morocco	3.8	1.0	-	4.8	4.7	1.6	-	6.3	22.4%	66.4%	-	31.1%
South Africa	6.9	4.9	0.4	12.3	6.9	5.3	0.4	12.6	0.7%	6.6%	-	3.0%
Other Africa	1.5	1.9	7.6	11.0	3.1	8.2	7.8	19.1	102.5%	345.3%	1.6%	73.4%
Total Africa	14.3	9.9	8.1	32.2	17.5	19.4	8.2	45.1	22.5%	96.7%	1.5%	40.0%
Australia	16.4	12.3	3.6	32.2	19.5	18.0	3.6	41.1	19.0%	46.2%	0.6%	27.3%
Bangladesh	†	0.3	†	0.3	†	0.4	†	0.4	-	41.2%	-	39.5%
China	365.8	176.9	93.7	636.4	405.7	223.8	102.8	732.3	10.9%	26.5%	9.7%	15.1%
China Hong Kong SAR	†	†	0.1	0.1	†	†	0.1	0.1	-3.4%	-3.4%	11.2%	10.8%
India	60.3	36.3	26.2	122.8	63.3	46.3	25.4	134.9	5.0%	27.3%	-3.2%	9.8%
Indonesia	0.2	†	14.4	14.6	0.2	0.1	15.7	16.0	-	218.1%	9.3%	9.4%
Japan	7.4	66.1	23.4	96.8	8.6	75.3	37.3	121.2	17.2%	14.0%	59.5%	25.2%
Malaysia	-	0.5	0.8	1.3	-	0.8	0.9	1.7	-	64.6%	8.5%	29.3%
New Zealand	2.1	0.1	8.4	10.5	2.3	0.1	8.4	10.8	9.1%	27.7%	0.9%	2.7%
Pakistan	3.1	1.0	1.0	5.2	4.8	1.2	0.9	6.9	52.3%	13.7%	-5.2%	33.5%
Philippines	1.2	1.2	11.5	13.9	1.2	1.3	11.8	14.3	1.9%	6.6%	2.0%	2.4%
Singapore	-	0.1	0.8	0.9	-	0.2	0.8	1.0	-	44.0%	-0.8%	5.9%
South Korea	2.6	9.7	11.7	23.9	2.8	12.1	14.3	29.2	6.8%	25.6%	22.9%	22.2%
Sri Lanka	0.4	0.3	0.1	0.8	0.4	0.4	0.1	0.8	-	16.2%	6.5%	7.4%
Taiwan	1.7	2.7	2.0	6.4	1.9	4.1	2.0	8.0	11.0%	51.3%	1.3%	25.3%
Thailand	1.9	5.0	10.9	17.8	2.7	5.0	13.7	21.4	36.6%	0.5%	26.4%	20.2%
Vietnam	0.3	0.1	0.1	0.5	0.5	4.2	0.1	4.7	58.2%	3583.7%	-	849.3%
Other Asia Pacific	0.4	0.5	0.2	1.1	0.5	0.7	0.2	1.4	43.5%	32.0%	-	31.1%
Total Asia Pacific	463.7	313.2	208.6	985.5	514.3	393.9	238.0	1146.2	10.9%	25.8%	14.1%	16.3%
Total World	1270.2	582.8	615.0	2468.0	1429.6	724.1	651.8	2805.5	12.6%	24.3%	6.0%	13.7%
of which: OECD	745.4	329.9	367.0	1442.4	841.8	387.2	387.8	1616.8	12.9%	17.4%	5.7%	12.1%
Non-OECD	524.7	252.8	248.0	1025.6	587.9	336.9	264.0	1188.8	12.0%	33.2%	6.5%	15.9%
European Union	376.9	127.5	196.4	700.9	430.7	138.4	199.1	768.2	14.3%	8.5%	1.3%	9.6%

*Based on gross generation and not accounting for cross-border electricity supply.

†Includes electricity generated from: geothermal, biomass and other sources of renewable energy (not already itemized).

†Less than 0.05%.

*Less than 0.05%.

A more extensive time series of renewables by source is available at bp.com/statisticalreview.

Renewables: Biofuels production*

Thousand barrels of oil equivalent per day											Growth rate per annum			Share 2019
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019	2008-18	
Canada	14	16	19	20	19	21	22	23	25	25	29	14.4%	9.4%	1.6%
Mexico	-	†	†	†	†	†	†	†	†	†	†	-	-	•
US	445	526	585	557	582	617	634	673	696	717	697	-2.7%	6.2%	37.9%
Total North America	460	542	604	577	601	638	656	696	722	742	726	-2.1%	6.3%	38.4%
Argentina	19	32	42	43	38	49	38	53	58	51	46	-9.9%	16.1%	2.5%
Brazil	286	316	270	276	321	337	362	340	342	413	444	7.6%	3.6%	24.1%
Colombia	5	8	10	11	12	12	12	12	11	14	13	-4.6%	16.7%	0.7%
Other S. & Cent. America	4	4	5	5	7	8	8	10	10	11	12	7.2%	2.1%	0.7%
Total S. & Cent. America	315	360	327	335	378	406	421	415	422	489	516	5.4%	4.6%	28.0%
Austria	7	7	7	7	7	6	7	8	7	7	7	-1.7%	3.7%	0.4%
Belgium	3	7	8	8	8	11	7	7	8	8	9	7.9%	-	0.5%
Finland	4	6	4	5	6	7	8	2	6	5	6	4.9%	12.8%	0.3%
France	44	43	42	49	48	51	53	49	52	58	51	-13.1%	4.1%	2.7%
Germany	47	59	58	54	58	65	60	60	62	64	64	0.6%	3.1%	3.5%
Italy	14	15	11	6	9	10	10	10	12	13	14	12.2%	0.8%	0.8%
Netherlands	5	7	13	24	28	34	36	29	37	36	35	-1.8%	37.8%	1.9%
Poland	8	8	8	12	13	14	15	17	17	17	17	5.5%	12.1%	1.0%
Portugal	4	5	6	5	5	6	6	6	6	6	7	20.2%	8.2%	0.4%
Spain	17	19	16	12	14	19	21	22	29	34	30	-13.4%	17.0%	1.6%
Sweden	3	4	4	4	4	4	4	4	3	4	4	26.3%	3.6%	0.2%
United Kingdom	4	5	3	6	9	7	6	10	14	13	11	-14.9%	9.2%	0.6%
Other Europe	20	20	22	26	28	28	32	33	35	39	40	2.5%	8.9%	2.2%
Total Europe	180	205	201	218	237	262	265	257	289	304	296	-2.6%	7.6%	16.1%
Total CIS	†	1	1	1	†	†	†	†	†	†	†	-	-	12.1%
Total Middle East	†	†	†	†	†	†	†	†	†	†	†	-	-	•
Total Africa	5	6	6	4	4	5	7	7	8	9	9	6.6%	25.5%	0.5%
Australia	4	3	4	4	5	5	4	4	2	3	3	6.3%	-0.7%	0.2%
China	31	30	37	39	44	49	42	40	49	47	50	6.6%	5.3%	2.7%
India	2	4	5	5	5	5	10	12	11	19	24	24.9%	20.9%	1.3%
Indonesia	3	4	27	33	41	59	24	54	50	91	123	35.7%	27.1%	6.7%
South Korea	4	6	5	7	7	7	8	8	8	8	8	-3.2%	11.3%	0.4%
Thailand	12	16	17	24	30	34	36	31	37	40	43	8.1%	14.9%	2.3%
Other Asia Pacific	8	8	16	22	28	34	36	34	33	35	43	21.6%	17.0%	2.3%
Total Asia Pacific	65	69	111	133	160	193	161	183	191	243	294	21.0%	14.6%	15.9%
Total World	1025	1183	1250	1268	1381	1505	1511	1560	1631	1787	1842	3.0%	6.8%	100.0%
of which: OECD	646	755	811	803	846	908	929	961	1016	1052	1027	-2.3%	6.7%	55.8%
Non-OECD	378	428	439	465	535	597	581	599	615	736	814	10.6%	7.1%	44.2%
European Union	179	204	199	216	235	260	262	254	285	299	291	-2.8%	7.6%	15.8%

Biofuels production by fuel type														
Biogasoline														
Canada & Mexico	13	15	17	17	17	17	17	17	18	19	22	11.9%	8.2%	1.9%
US	417	507	531	502	506	545	564	585	607	613	601	-2.0%	5.7%	52.6%
Brazil	263	281	231	236	278	287	304	284	279	334	357	6.9%	2.1%	31.3%
Other S. & Cent. America	6	7	9	10	13	16	18	21	22	24	24	1.0%	8.0%	2.1%
Europe	31	36	41	47	53	53	58	54	57	59	57	-3.7%	8.7%	4.9%
CIS	-	-	-	-	†	†	†	†	†	†	†	-	-	•
Middle East	†	†	†	†	†	†	†	†	†	†	†	-	-	•
Africa	5	6	6	4	4	5	6	6	5	6	6	0.5%	20.8%	0.5%
Asia Pacific	31	32	40	42	48	55	59	54	61	67	76	13.3%	8.8%	6.6%
Total World	765	883	875	858	921	978	1027	1021	1050	1122	1143	1.8%	4.8%	100.0%
of which: OECD	463	560	591	569	579	617	641	657	683	692	681	-1.7%	5.9%	59.6%
Non-OECD	302	323	283	290	342	361	386	363	367	430	462	7.5%	3.3%	40.4%
European Union	30	36	41	47	51	52	57	53	56	57	55	-3.8%	8.6%	4.8%

Biodiesel														
Canada & Mexico	2	2	2	2	2	4	5	6	7	6	7	22.0%	15.7%	1.0%
US	29	19	54	55	76	71	70	87	89	104	96	-7.2%	10.6%	13.8%
Brazil	24	35	39	40	43	50	58	56	63	79	87	10.3%	16.5%	12.4%
Other S. & Cent. America	22	37	48	49	43	53	40	54	57	52	47	-9.8%	15.8%	6.8%
Europe	149	168	160	171	184	209	207	204	232	246	240	-2.4%	7.4%	34.3%
CIS	†	1	1	1	†	†	†	†	†	†	†	-	-	12.1%
Middle East	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Asia Pacific	34	37	71	91	111	138	102	130	130	176	218	19.5%	-	0.5%
Total World	260	300	375	409	460	526	483	539	581	665	699	5.1%	11.6%	100.0%
of which: OECD	183	195	220	234	267	291	288	304	333	359	347	-3.4%	8.3%	49.6%
Non-OECD	77	105	155	175	193	236	195	235	248	306	352	15.0%	17.6%	50.4%
European Union	148	168	159	169	183	209	205	202	229	242	236	-2.6%	7.3%	33.7%

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

†Less than 0.5.

•Less than 0.05%.

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

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

Renewables: Biofuels consumption*

Thousand barrels of oil equivalent per day												Growth rate per annum			Share 2019
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019	2008-18		
Canada	15	16	25	29	33	34	34	34	35	37	38	2.1%	10.5%	2.1%	
Mexico	2	2	2	2	2	3	3	4	4	4	4	1.4%	8.4%	0.2%	
US	438	504	541	539	583	591	615	661	662	655	655	-0.1%	5.5%	36.9%	
Total North America	456	522	567	570	618	629	651	699	701	696	696	0.1%	5.7%	39.2%	
Argentina	-	10	14	17	19	23	25	26	30	29	30	2.1%	n/a	1.7%	
Brazil	253	269	246	232	273	301	357	324	341	395	437	10.6%	5.6%	24.6%	
Colombia	†	†	1	1	1	1	1	1	1	1	1	2.8%	11.5%	•	
Other S. & Cent. America	9	11	12	14	15	16	17	17	18	18	19	4.7%	8.8%	1.1%	
Total S. & Cent. America	262	290	272	264	308	340	399	368	389	443	486	9.8%	6.4%	27.4%	
Austria	10	10	10	10	8	10	12	10	9	9	10	1.4%	1.9%	0.5%	
Belgium	2	7	7	7	6	8	5	8	9	9	9	•	n/a	0.5%	
Finland	2	2	4	4	4	8	8	3	7	6	6	-1.4%	15.8%	0.3%	
France	45	44	44	48	49	53	53	53	54	53	56	4.5%	2.3%	3.1%	
Germany	51	52	54	57	51	54	50	50	51	54	54	0.1%	0.4%	3.0%	
Italy	21	26	25	28	24	20	25	25	25	26	15	-42.6%	7.2%	0.8%	
Netherlands	7	4	6	6	6	7	6	5	8	12	14	15.8%	8.0%	0.8%	
Poland	12	12	13	14	14	13	12	8	11	17	18	6.7%	7.6%	1.0%	
Portugal	4	6	6	5	5	5	7	5	5	5	5	-1.4%	7.5%	0.3%	
Spain	6	27	32	39	17	18	19	21	25	32	25	-22.1%	23.6%	1.4%	
Sweden	6	9	11	12	12	16	19	25	28	27	28	3.3%	15.8%	1.6%	
United Kingdom	19	22	20	17	20	22	18	18	18	24	31	27.4%	5.0%	1.8%	
Other Europe	19	23	27	31	38	37	37	43	50	53	56	6.1%	12.8%	3.1%	
Total Europe	205	244	258	279	255	272	272	276	300	327	325	-0.5%	6.6%	18.3%	
Total CIS	†	†	†	†	†	†	†	†	†	†	†	0.5%	12.7%	•	
Total Middle East	†	†	†	†	†	†	†	†	†	†	†	1.7%	-4.0%	•	
Total Africa	†	†	†	†	†	†	†	†	†	†	†	19.1%	59.1%	0.1%	
Australia	20	31	33	29	28	26	24	20	23	26	25	-2.3%	6.3%	1.4%	
China	29	29	34	39	46	61	36	42	43	50	44	-10.4%	6.5%	2.5%	
India	†	†	1	1	1	1	2	3	2	2	2	-0.5%	6.6%	0.1%	
Indonesia	3	3	5	10	15	27	13	44	38	55	111	102.0%	57.1%	6.3%	
South Korea	5	7	6	7	7	7	8	8	8	13	13	0.7%	14.4%	0.7%	
Thailand	12	13	14	18	23	28	31	32	35	38	45	16.9%	15.4%	2.5%	
Other Asia Pacific	4	9	10	12	15	19	23	25	26	26	26	1.7%	29.1%	1.5%	
Total Asia Pacific	74	91	103	116	135	170	138	174	175	209	267	27.5%	14.0%	15.0%	
Total World	997	1148	1201	1229	1317	1412	1463	1518	1567	1676	1776	6.0%	6.8%	100.0%	
of which: OECD	683	805	864	883	905	934	957	1003	1032	1060	1056	-0.4%	6.1%	59.4%	
Non-OECD	314	343	337	346	412	477	506	515	535	617	720	16.8%	8.2%	40.6%	
European Union	203	241	255	274	244	266	266	265	284	313	311	-0.7%	6.2%	17.5%	

Biofuels consumption by fuel type														
Biogasoline														
US	420	490	491	489	503	512	531	545	552	549	554	0.8%	4.1%	49.4%
Canada & Mexico	16	16	22	26	29	32	32	33	33	35	36	3.3%	9.0%	3.2%
Brazil	230	234	208	191	230	251	299	268	277	316	349	10.5%	4.0%	31.1%
Other S. & Cent. America	7	9	10	12	15	17	19	21	23	24	24	3.3%	14.4%	2.2%
Europe	45	56	58	58	55	55	56	54	57	59	64	8.8%	4.7%	5.7%
CIS	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	-
Middle East	†	†	†	†	†	†	†	†	†	†	†	1.7%	-4.0%	•
Africa	†	†	†	†	†	†	†	†	†	†	†	4.3%	19.2%	•
Asia Pacific	48	61	66	66	73	77	77	86	95	94	94	-0.2%	9.8%	8.4%
Total World	766	867	857	843	905	945	1015	1007	1037	1077	1122	4.1%	4.8%	100.0%
of which: OECD	502	596	606	604	616	627	646	657	670	673	682	1.3%	4.5%	60.8%
Non-OECD	264	271	250	240	289	318	369	350	367	404	439	8.8%	5.2%	39.2%
European Union	45	56	58	58	53	53	54	51	54	56	61	9.2%	4.2%	5.4%

Biodiesel														
US	18	15	49	50	80	79	83	116	111	106	101	-4.5%	20.1%	15.4%
Canada & Mexico	1	2	4	5	5	6	4	5	6	6	5	-5.7%	27.7%	0.8%
Brazil	23	35	38	40	43	50	58	56	63	79	87	11.0%	16.9%	13.3%
Other S. & Cent. America	3	12	16	20	20	22	23	23	25	24	25	2.9%	29.1%	3.8%
Europe	160	187	200	220	200	217	217	222	243	268	261	-2.6%	7.0%	39.9%
CIS	†	†	†	†	†	†	†	†	†	†	†	0.5%	12.7%	0.1%
Middle East	-	-	-	-	-	-	-	-	-	-	-	n/a	n/a	-
Africa	-	-	-	-	-	†	1	1	1	1	1	20.0%	n/a	0.2%
Asia Pacific	26	30	36	49	63	93	61	89	80	115	173	50.1%	19.4%	26.4%
Total World	231	281	344	386	412	467	448	511	530	599	655	9.2%	12.1%	100.0%
of which: OECD	181	210	258	280	289	307	311	346	362	386	374	-3.3%	9.6%	57.1%
Non-OECD	50	72	86	106	122	159	137	165	168	213	281	31.9%	19.3%	42.9%
European Union	158	185	197	216	191	213	212	214	230	257	250	-2.8%	6.7%	38.1%

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

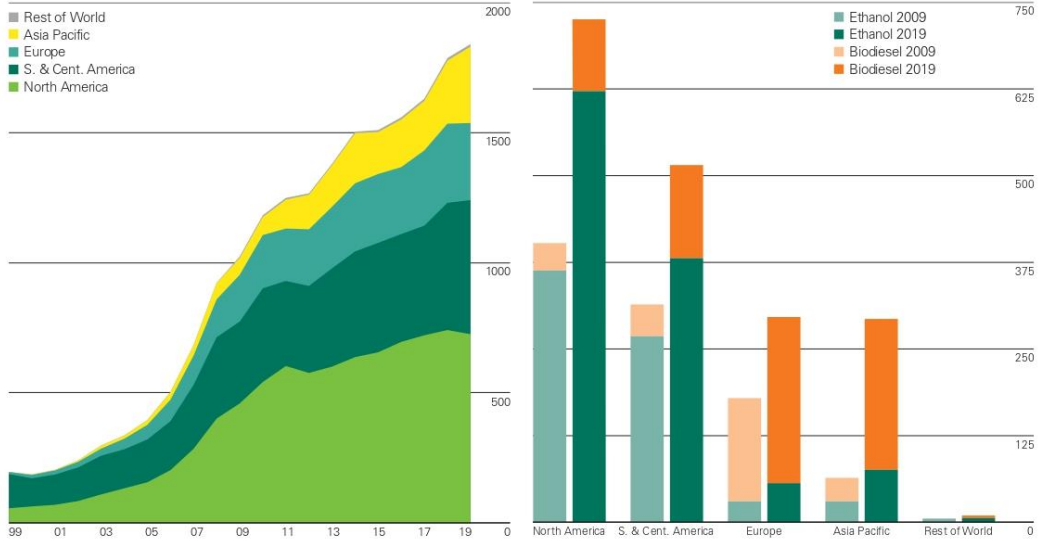
†Less than 0.5.

•Less than 0.05%.

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

World biofuels production

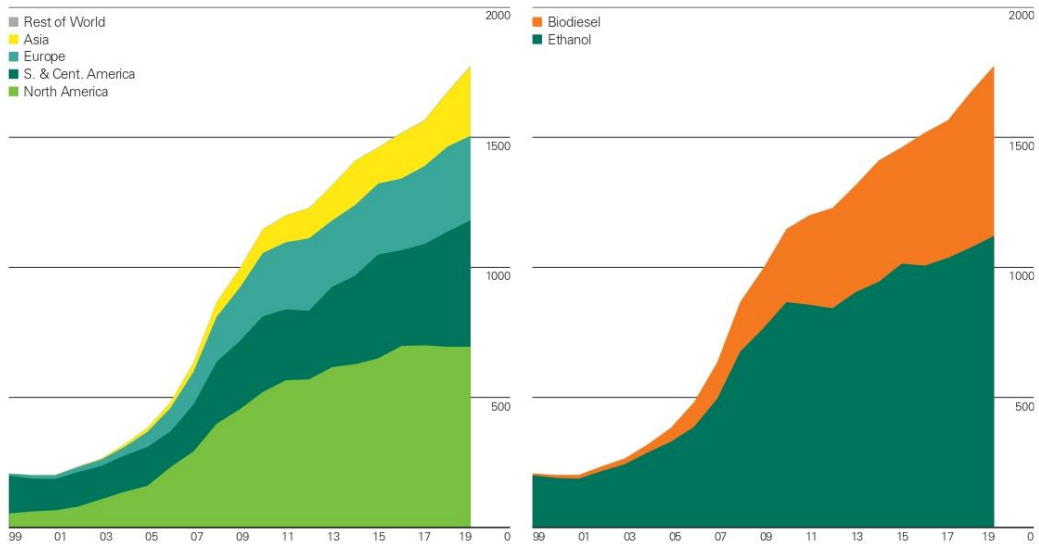
Thousand barrels of oil equivalent per day



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

World biofuels consumption

Thousand barrels of oil equivalent per day



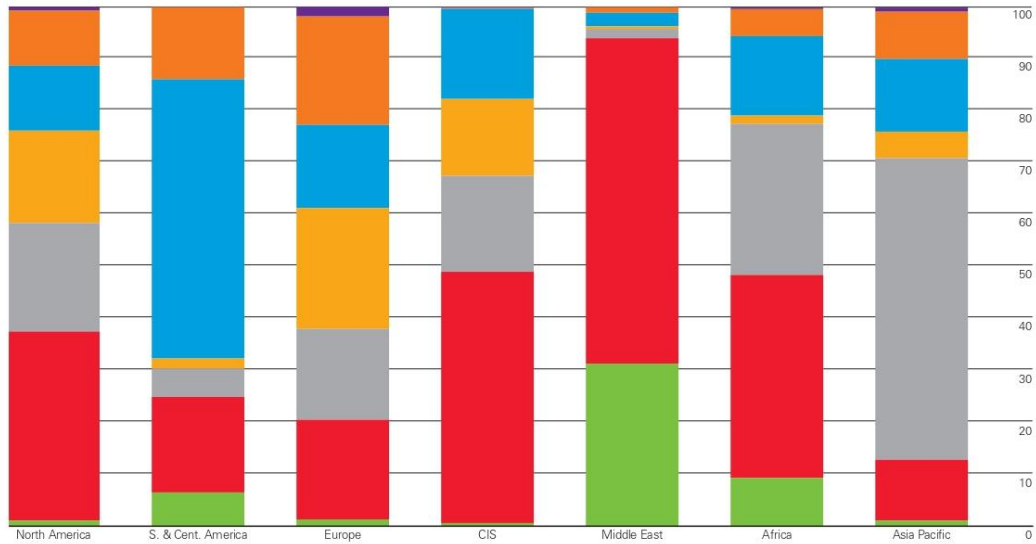
Biofuels consumption rose by 6% (100,000 boe/d). As with production, growth was driven mainly by Brazil (42,000 boe/d), most of which was ethanol and Indonesia (56,000 boe/d), which was largely biodiesel. At the global level, ethanol made up 63% of biofuels in 2019, but the share of biodiesel has risen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

Electricity generation*

Terawatt-hours											Growth rate per annum		Share 2019	
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2019		2008-18
Canada	613.9	607.0	638.3	636.5	655.7	647.6	669.3	663.0	664.5	652.3	660.4	1.2%	0.3%	2.4%
Mexico	267.8	275.6	292.1	296.4	297.1	303.3	310.3	320.3	329.1	349.3	364.0	4.2%	2.6%	1.3%
US	4206.5	4394.3	4363.4	4310.6	4330.3	4363.3	4348.7	4347.9	4302.5	4457.4	4401.3	-1.3%	0.2%	16.3%
Total North America	5088.2	5276.8	5293.8	5243.5	5283.1	5314.2	5318.4	5331.2	5296.1	5459.0	5425.7	-0.6%	0.3%	20.1%
Argentina	122.3	126.0	129.5	136.0	139.4	138.6	145.4	147.2	145.6	146.8	139.9	-4.7%	1.9%	0.5%
Brazil	466.2	515.8	531.8	552.5	570.8	590.5	581.2	578.9	589.3	601.4	625.6	4.0%	2.7%	2.3%
Chile	53.7	61.3	65.2	69.7	73.0	71.6	74.5	77.7	78.6	82.3	83.9	1.9%	3.3%	0.3%
Colombia	63.2	64.7	66.2	67.7	69.8	72.7	75.0	74.4	75.1	78.3	75.2	-3.9%	2.5%	0.3%
Ecuador	18.3	19.5	20.5	22.8	23.3	24.3	26.0	27.3	28.0	29.7	32.9	10.7%	4.8%	0.1%
Peru	32.9	35.9	38.8	41.0	43.3	45.5	48.3	51.7	52.7	54.9	57.3	4.4%	5.4%	0.2%
Trinidad & Tobago	7.8	8.5	8.8	9.1	9.5	9.9	10.3	10.7	11.0	10.6	11.1	5.1%	3.2%	0.1%
Venezuela	124.8	116.7	122.9	127.9	130.0	128.3	123.8	113.8	109.4	105.1	84.9	-19.3%	-1.3%	0.3%
Other S. & Cent. America	187.7	192.0	197.4	204.6	208.5	205.9	212.4	224.8	218.2	222.0	218.6	-1.5%	1.7%	0.8%
Total S. & Cent. America	1082.9	1140.4	1181.1	1231.4	1267.7	1287.5	1296.9	1306.6	1308.0	1331.0	1329.3	-0.1%	2.2%	4.9%
Austria	69.1	71.1	65.9	72.4	68.0	65.1	64.9	67.9	70.7	68.0	73.4	8.0%	0.2%	0.3%
Belgium	91.2	95.2	90.2	82.9	83.5	72.6	69.8	85.7	86.6	74.9	83.6	24.9%	-1.2%	0.3%
Czech Republic	82.3	85.9	87.6	87.6	87.1	96.0	83.9	83.3	87.0	88.0	87.0	-1.2%	0.5%	0.3%
Finland	72.5	81.1	73.7	70.5	71.4	68.2	68.8	68.8	67.1	70.2	68.7	-2.1%	-1.0%	0.2%
France	535.9	569.3	565.0	564.5	573.8	564.2	570.3	556.2	554.1	574.2	555.4	-3.3%	0.1%	2.1%
Germany	596.6	633.1	613.1	630.1	638.7	627.8	648.1	650.7	653.7	643.5	612.4	-4.8%	0.1%	2.3%
Greece	61.4	57.4	59.4	61.0	57.2	50.5	51.9	54.4	55.3	53.3	50.2	-5.8%	-1.8%	0.2%
Hungary	36.9	37.4	36.0	34.6	30.3	29.4	30.4	31.9	32.9	32.0	33.9	6.0%	-2.2%	0.1%
Italy	292.6	302.1	302.6	299.3	289.8	278.9	283.0	289.8	295.8	289.7	283.8	-2.0%	-1.0%	1.1%
Netherlands	113.8	118.1	113.0	102.5	100.9	103.4	110.1	115.2	117.3	114.5	121.0	5.7%	0.6%	0.4%
Norway	131.8	123.6	127.6	147.7	134.0	142.0	144.5	149.0	149.4	147.1	134.8	-8.3%	0.3%	0.5%
Poland	151.7	157.7	163.5	162.1	164.6	159.1	164.9	166.6	170.5	170.0	163.9	-3.6%	0.9%	0.6%
Portugal	50.2	54.1	52.5	46.6	51.7	52.8	52.4	60.3	59.4	59.6	53.7	-10.0%	2.6%	0.2%
Romania	58.0	61.0	62.2	59.0	58.9	63.3	66.3	65.1	64.3	64.8	59.5	-8.2%	0.2%	0.2%
Spain	236.3	300.4	291.8	297.6	285.3	278.8	281.0	274.6	275.6	274.5	275.8	0.5%	-1.3%	1.0%
Sweden	136.7	148.3	151.2	166.3	153.2	153.7	182.1	156.1	164.3	163.4	169.8	3.9%	0.9%	0.6%
Switzerland	68.3	68.0	64.8	70.0	70.4	72.0	67.9	63.3	63.3	69.4	68.3	-1.6%	0.1%	0.3%
Turkey	194.8	211.2	229.4	239.5	240.2	252.0	261.8	274.4	297.3	304.8	308.5	1.2%	4.4%	1.1%
Ukraine	173.6	188.8	194.9	198.9	194.4	182.8	163.7	164.6	156.0	159.9	154.5	-3.4%	-1.8%	0.6%
United Kingdom	376.8	382.1	368.0	363.9	358.3	338.1	338.9	339.2	338.2	332.9	323.7	-2.8%	-1.5%	1.2%
Other Europe	306.5	320.0	307.1	295.4	309.2	297.2	298.2	305.9	303.5	312.7	301.5	-3.6%	0.1%	1.1%
Total Europe	3894.7	4065.8	4019.4	4052.4	4020.6	3938.5	3982.9	4023.1	4062.2	4067.2	3993.3	-1.8%	-0.1%	14.8%
Azerbaijan	18.9	18.7	20.3	23.0	23.4	24.7	24.7	25.0	24.3	25.2	26.3	4.4%	1.5%	0.1%
Belarus	30.4	34.9	32.2	30.8	31.5	34.7	34.2	33.6	34.5	38.9	40.4	3.8%	1.1%	0.1%
Kazakhstan	78.7	82.6	86.6	90.6	82.6	94.6	91.6	94.6	103.1	107.3	108.4	1.0%	2.9%	0.4%
Russian Federation	993.1	1038.0	1054.9	1069.3	1069.1	1084.2	1067.5	1091.0	1091.2	1109.2	1118.1	0.8%	0.6%	4.1%
Turkmenistan	16.0	16.7	17.2	17.8	18.9	20.1	21.5	22.6	22.8	24.2	25.7	6.3%	4.9%	0.1%
Uzbekistan	50.1	51.9	52.8	53.0	54.9	55.4	57.3	59.1	60.8	62.9	62.9	0.1%	2.3%	0.2%
Other CIS	39.1	41.1	44.6	46.0	43.3	44.1	44.0	43.5	46.3	48.6	49.2	1.1%	2.0%	0.2%
Total CIS	1226.2	1284.0	1308.5	1330.4	1323.7	1337.9	1340.9	1369.3	1383.0	1416.3	1431.0	1.0%	1.0%	5.3%
Iran	221.8	235.7	235.6	248.8	258.9	273.5	279.5	286.1	305.2	314.4	318.7	1.4%	4.1%	1.2%
Iraq	41.3	41.7	42.2	47.8	62.1	71.2	75.3	86.3	93.6	99.9	131.5	31.6%	11.0%	0.5%
Israel	55.3	58.5	59.3	63.0	61.4	61.3	64.3	67.3	67.6	69.0	71.8	4.1%	2.1%	0.3%
Kuwait	53.2	57.1	57.5	62.7	61.0	65.1	68.3	70.1	72.9	74.2	75.0	1.1%	3.7%	0.3%
Oman	18.4	19.8	21.9	25.0	26.2	29.1	32.8	34.2	36.1	37.7	37.4	0.7%	8.9%	0.1%
Qatar	24.2	28.1	30.7	34.8	34.7	38.7	41.5	42.3	45.6	47.9	48.6	1.4%	8.3%	0.2%
Saudi Arabia	217.3	240.1	250.1	271.7	284.1	311.8	338.5	345.6	355.2	359.2	357.4	-0.5%	5.8%	1.3%
United Arab Emirates	85.7	93.9	99.1	106.2	110.0	116.5	127.4	129.6	134.6	136.0	138.1	1.5%	5.4%	0.5%
Other Middle East	90.7	98.7	93.4	88.3	83.7	83.5	81.6	82.0	86.4	85.8	86.1	0.4%	-0.1%	0.3%
Total Middle East	807.9	873.7	889.7	948.2	982.0	1050.9	1109.0	1143.6	1197.0	1224.1	1264.7	3.3%	4.8%	4.7%
Algeria	43.1	45.7	53.1	57.4	59.9	64.2	68.8	71.0	76.0	76.7	81.3	6.0%	6.7%	0.3%
Egypt	134.3	144.4	149.6	162.8	165.1	171.2	181.8	188.2	193.2	199.4	200.6	0.6%	4.5%	0.7%
Morocco	21.7	23.7	25.4	27.7	28.1	29.3	30.3	30.7	31.6	34.4	40.1	16.6%	5.1%	0.1%
South Africa	249.6	259.6	262.5	257.9	256.1	254.8	250.1	252.7	255.1	256.3	252.6	-1.5%	-0.1%	0.9%
Other Africa	178.5	198.1	198.5	214.8	234.2	247.9	256.3	259.8	272.1	279.0	295.6	6.0%	5.0%	1.1%
Total Africa	627.1	671.6	689.0	720.6	743.4	767.4	787.4	802.5	828.1	845.8	870.1	2.9%	3.2%	3.2%
Australia	249.9	251.0	256.3	250.7	249.6	247.6	255.2	258.5	259.1	263.1	265.1	0.8%	0.7%	1.0%
Bangladesh	37.2	40.8	44.2	48.7	54.4	57.4	61.8	70.0	73.4	81.1	89.7	10.6%	9.0%	0.3%
China	3714.7	4207.2	4713.0	4967.6	5431.6	5794.5	5814.6	6133.2	6604.4	7166.1	7503.4	4.7%	7.4%	27.8%
China Hong Kong SAR	38.7	38.4	38.1	38.8	39.2	39.9	38.0	38.3	37.0	36.6	36.9	0.9%	-0.4%	0.1%
India	879.7	937.5	1034.0	1091.8	1146.1	1262.2	1317.3	1401.7	1473.8	1551.4	1558.7	0.5%	6.5%	5.8%
Indonesia	158.8	169.8	183.4	200.3	216.2	228.6	234.0	247.9	254.6	267.1	279.1	4.5%	6.0%	1.0%
Japan	1114.0	1156.0	1104.2	1106.9	1087.8	1062.7	1030.1	1030.3	1042.6	1056.2	1036.3	-1.9%	-1.1%	3.8%
Malaysia	116.1	125.0	127.1	134.1	141.0	147.5	150.1	156.7	160.6	167.3	171.0	2.2%	3.9%	0.6%
New Zealand	43.4	44.9	44.4	44.2	43.3	43.5	44.2	43.7	44.2	44.2	44.6	0.8%	0.1%	0.2%
Pakistan	98.8	99.4	100.6	99.5	101.8	106.2	106.7	120.0	122.5	136.0	136.3	0.2%	3.9%	0.5%
Philippines	61.9	67.7	69.2	72.9	75.3	77.3	82.4	90.8	94.4	99.8	105.8	6.1%	5.1%	0.4%
Singapore	41.8	45.4	46.0	46.9	48.0	49.3	50.3	51.6	52.2	52.9	54.1	2.3%	2.4%	0.2%
South Korea	452.4	49												

Regional electricity generation by fuel 2019

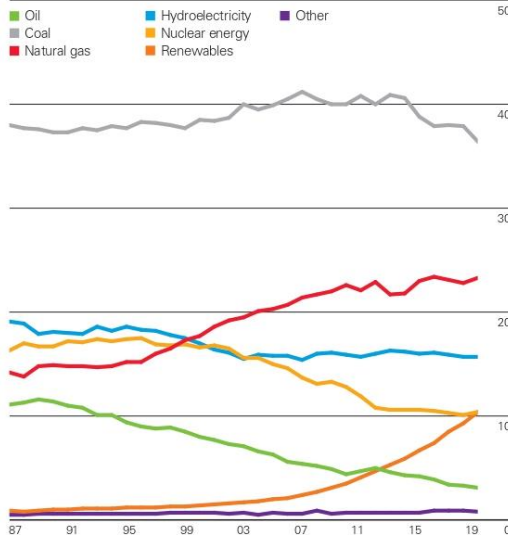
Percentage



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

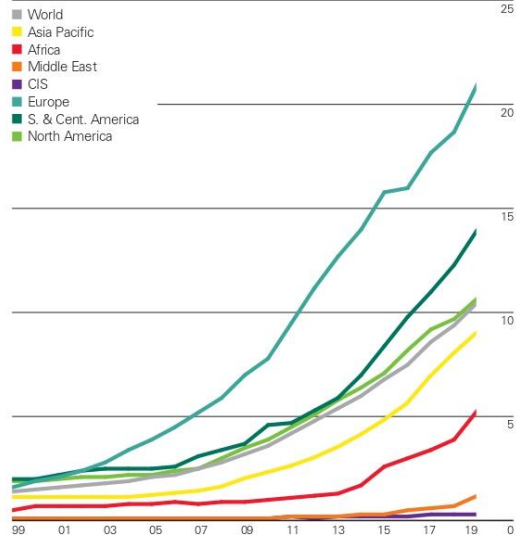
Share of global electricity generation by fuel

Percentage



Renewables share of power generation by region

Percentage



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

Electricity generation by fuel*

Terawatt-hours	2018							2019							Total	
	Oil	Natural Gas	Coal	Nuclear energy	Hydro electric	Renewables	Other†	Oil	Natural Gas	Coal	Nuclear energy	Hydro electric	Renewables	Other‡		
Canada	3.8	64.1	50.6	100.0	395.9	47.1	0.7	652.3	4.1	69.3	54.6	100.5	392.0	49.3	0.7	660.4
Mexico	35.7	194.6	29.0	13.6	32.5	23.3	20.6	349.3	37.7	205.6	26.3	11.3	23.8	37.8	21.6	364.0
US	27.1	1579.3	1246.7	849.6	289.5	451.6	13.6	4457.4	20.0	1700.9	1053.5	852.0	271.2	489.8	14.0	4401.3
Total North America	66.7	1838.0	1326.3	963.2	707.9	522.0	34.9	5459.0	61.8	1975.8	1134.4	963.7	676.9	576.9	36.2	5425.7
Argentina	6.7	84.9	2.1	6.9	41.6	4.0	0.5	146.8	2.8	82.3	0.7	8.4	37.1	8.2	0.5	139.9
Brazil	12.2	54.6	23.7	15.7	389.0	106.3	-	601.4	7.9	58.9	25.7	16.2	399.3	117.7	-	625.6
Other S. & C. America	95.1	104.0	44.6	-	287.6	51.6	-0.1	582.8	75.6	103.8	47.8	-	278.3	58.3	-0.1	563.8
Total S. & C. America	113.9	243.5	70.4	22.5	718.2	161.9	0.5	1331.0	86.3	245.0	74.3	24.6	714.7	184.1	0.4	1329.3
Germany	5.2	82.5	228.2	76.0	18.0	206.8	26.8	643.5	5.1	91.0	171.2	75.1	20.2	224.1	25.7	612.4
Italy	11.0	128.5	31.0	-	47.1	65.6	6.5	289.7	10.2	126.5	29.7	-	45.1	67.6	4.7	283.8
Netherlands	1.3	57.7	27.5	3.5	0.1	18.8	5.6	114.5	1.4	71.0	17.4	3.9	0.1	22.3	5.0	121.0
Poland	1.8	12.6	133.3	-	2.0	19.6	0.7	170.0	1.2	14.8	121.9	-	2.0	23.1	1.0	163.9
Spain	14.5	58.0	38.7	55.8	34.8	69.8	2.9	274.5	13.4	86.0	13.1	58.4	25.2	77.5	2.1	275.8
Turkey	0.3	92.5	113.2	-	59.9	37.8	1.0	304.8	0.2	58.1	114.6	-	89.2	45.3	1.1	306.5
Ukraine	0.7	9.0	52.1	84.4	10.4	2.5	0.7	159.9	0.2	9.2	48.3	83.0	6.8	5.0	1.9	154.5
United Kingdom	1.7	131.5	16.8	65.1	5.5	104.5	7.8	332.9	1.0	132.5	6.9	56.2	6.0	113.4	7.8	323.7
Other Europe	19.5	157.5	215.8	651.1	467.5	230.8	35.2	1777.5	19.0	179.1	175.6	651.9	438.0	258.3	27.9	1749.7
Total Europe	56.1	729.9	856.6	935.8	645.3	756.3	87.1	4067.2	51.8	768.1	698.6	928.5	632.5	836.6	77.2	3993.3
Kazakhstan	0.8	20.7	79.6	-	10.4	0.5	-4.7	107.3	0.8	20.8	78.1	-	10.0	0.8	-2.1	108.4
Russian Federation	6.8	511.1	190.3	204.6	190.6	1.4	4.4	1109.2	6.9	519.5	182.2	209.0	194.4	1.8	4.3	1118.1
Other CIS	0.9	148.6	4.1	2.1	43.3	0.6	0.3	199.9	0.9	152.7	4.0	2.2	44.0	0.7	0.1	204.5
Total CIS	8.5	680.4	274.0	206.7	244.3	2.5	†	1416.3	8.6	693.0	264.2	211.2	248.4	3.3	2.3	1431.0
Iran	86.0	209.0	0.6	6.9	11.4	0.5	-	314.4	82.6	199.5	0.6	6.4	29.0	0.6	-	318.7
Saudi Arabia	158.8	200.0	-	-	-	0.4	-	369.2	149.6	206.0	-	-	-	1.8	-	357.4
United Arab Emirates	†	134.7	-	-	-	1.3	-	136.0	†	133.9	-	-	-	4.2	-	138.1
Other Middle East	147.5	238.0	20.6	-	3.1	5.3	-	414.5	163.9	253.5	21.9	-	4.3	6.8	-	450.5
Total Middle East	392.3	781.6	21.3	6.9	14.5	7.5	-	1224.1	396.1	792.9	22.6	6.4	33.3	13.3	-	1264.7
Egypt	28.8	153.7	-	-	13.4	3.5	-	199.4	28.2	152.5	-	-	13.4	6.5	-	200.6
South Africa	1.2	1.9	224.6	11.1	0.8	12.3	4.6	256.3	1.2	1.9	217.3	14.2	0.8	12.6	4.6	252.6
Other Africa	49.3	175.8	32.0	-	116.3	16.4	0.3	390.1	51.9	186.1	36.2	-	118.6	26.0	-1.8	417.0
Total Africa	79.3	331.3	256.6	11.1	130.4	32.2	4.9	845.8	81.3	340.5	253.6	14.2	132.7	45.1	2.8	870.1
Australia	5.4	51.4	156.5	-	17.4	32.2	0.1	263.1	5.8	54.4	149.5	-	14.3	41.1	0.1	265.1
China	5.5	215.5	4765.0	295.0	1198.9	636.4	49.8	7166.1	6.0	236.5	4853.7	348.7	1269.7	732.3	56.5	7503.4
India	8.5	73.9	1167.3	39.1	139.6	122.8	0.2	1551.4	8.2	71.0	1137.4	45.2	161.8	134.9	0.2	1558.7
Indonesia	18.1	57.3	160.0	-	16.8	14.6	0.3	267.1	17.3	51.6	177.0	-	17.0	16.0	0.3	279.1
Japan	66.2	386.9	323.0	49.1	81.0	96.8	53.3	1056.2	44.7	362.4	326.2	65.6	73.9	121.2	42.3	1036.3
Malaysia	1.3	64.8	73.5	-	26.5	1.3	-	167.3	2.6	68.6	71.1	-	27.0	1.7	-	171.0
South Korea	10.1	160.9	250.9	133.5	3.4	23.9	10.7	593.4	7.4	150.8	238.7	146.0	2.8	29.2	9.7	584.7
Taiwan	8.2	92.4	131.2	27.7	4.5	6.4	5.2	275.6	5.8	91.1	126.4	32.3	5.5	8.0	5.0	274.2
Thailand	0.2	116.3	35.8	-	7.6	17.8	†	177.6	1.1	121.8	35.8	-	6.3	21.4	†	186.5
Vietnam	0.2	40.1	83.9	-	84.5	0.5	-	209.2	1.4	43.1	112.5	-	65.6	4.7	-	227.4
Other Asia Pacific	49.9	218.2	138.9	9.8	130.8	32.8	1.9	582.2	39.1	231.4	148.0	9.5	139.7	35.7	0.5	604.0
Total Asia Pacific	173.5	1477.7	7286.1	554.1	1710.9	985.5	121.5	12309.3	139.5	1482.6	7376.4	647.3	1783.7	1146.2	114.8	12690.5
Total World	890.4	6082.5	10091.3	2700.4	4171.4	2468.0	248.9	26652.7	825.3	6297.9	9824.1	2796.0	4222.2	2805.5	233.6	27004.7
of which: OECD	196.4	3201.2	2829.6	1969.8	1423.0	1442.4	183.9	11246.1	164.9	3347.5	2471.0	1993.0	1380.2	1616.8	162.6	11136.0
Non-OECD	694.0	2881.3	7261.7	730.6	2748.4	1025.6	65.0	15406.6	660.4	2950.4	7353.1	803.0	2842.1	1188.8	71.0	15868.7
EU	52.6	621.2	643.6	827.0	346.9	700.9	77.9	3270.1	49.1	692.2	488.4	822.4	327.9	768.2	67.2	3215.3

*Based on gross output.

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

‡Less than 0.05.

Key minerals for the energy transition

Cobalt production

Mine production

Thousand tonnes											Growth rate per annum			Share 2019
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2008-18		
Australia	4.6	3.9	3.9	5.9	6.4	6.2	6.0	5.5	5.8	4.9	5.1	4.5%	0.2%	4.2%
Canada	3.9	4.6	6.8	3.7	4.0	3.9	4.3	4.2	3.7	3.5	3.3	-5.3%	-8.9%	2.7%
Democratic Republic of Congo	56.1	84.0	99.5	86.4	76.6	76.5	84.4	69.0	90.3	109.4	78.0	-28.7%	9.9%	64.0%
Cuba	4.6	4.8	5.1	4.7	4.0	3.7	4.3	5.1	5.0	4.5	4.7	4.4%	1.2%	3.8%
Madagascar	-	0.2	0.5	0.6	2.4	3.4	4.0	3.8	3.4	3.3	3.4	1.8%	n/a	2.8%
Morocco	2.6	3.1	2.2	2.0	2.0	2.2	2.3	2.7	2.5	2.1	2.1	-	2.1%	1.7%
New Caledonia	2.0	2.9	3.1	2.7	3.2	4.0	3.7	3.4	2.8	1.7	1.2	-25.3%	-2.4%	1.0%
Papua New Guinea	-	-	n/a	0.5	1.0	2.1	2.5	2.2	3.3	3.3	3.1	-5.5%	n/a	2.5%
Philippines	1.4	2.1	2.0	2.7	2.8	4.6	4.3	4.1	4.6	4.4	4.6	4.3%	14.0%	3.8%
Russian Federation	6.1	6.2	6.1	6.3	6.3	6.3	6.2	5.5	5.9	6.1	6.1	-	-0.2%	5.0%
South Africa	0.6	1.8	1.6	2.5	3.0	3.0	2.9	2.3	2.3	2.3	2.4	4.3%	14.6%	2.0%
Zambia	5.9	8.6	7.7	5.4	5.9	4.6	3.0	5.0	2.6	1.8	1.3	-20.0%	-10.1%	1.0%
Rest of World	5.7	7.3	9.8	11.4	12.9	9.0	8.6	6.3	5.5	7.5	6.5	-13.9%	1.7%	5.3%
Total World	93.5	129.5	148.2	134.7	130.5	129.4	136.5	119.1	137.8	154.6	121.8	-21.2%	6.4%	100.0%

Sources: includes data from US Geological Survey, British Geological Survey © UKRI and World Mining Data.

Lithium production

Mine production

Thousand tonnes of lithium content											Growth rate per annum			Share 2019
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2008-18		
Argentina	2.2	3.0	3.0	2.7	2.5	3.2	3.6	5.8	5.7	6.4	6.4	-	7.3%	8.3%
Australia	5.5	8.5	11.7	12.7	10.1	12.4	11.9	14.0	21.3	57.0	40.7	-28.6%	23.9%	52.9%
Brazil	0.2	0.2	0.3	0.2	0.4	0.2	0.2	0.2	0.2	0.3	0.3	-	6.5%	0.4%
Chile	6.0	10.4	13.6	13.9	11.7	12.0	10.9	15.2	15.8	18.8	16.6	-12.0%	5.5%	21.5%
China	3.8	4.0	4.1	4.5	4.7	2.3	2.0	2.3	6.8	7.1	7.5	5.6%	8.0%	9.7%
Portugal	-	0.8	0.8	0.6	0.6	0.3	0.2	0.4	0.8	0.8	1.2	50.0%	1.3%	1.6%
US	1.5	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	-	-5.0%	1.2%
Zimbabwe	0.4	0.5	0.5	1.1	1.0	0.9	0.9	1.0	0.8	1.6	1.6	-	12.3%	2.1%
Rest of World	0.3	n/a	n/a	-	-	-	-	0.2	1.1	2.3	1.8	-21.8%	12.8%	2.3%
Total World	19.8	28.2	35.0	36.6	31.9	32.2	30.7	40.0	53.3	95.2	77.0	-19.2%	13.2%	100.0%

Sources: includes data from US Geological Survey, British Geological Survey © UKRI and World Mining Data.

Natural graphite production

Mine production

Thousand tonnes											Growth rate per annum			Share 2019
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2008-18		
Brazil ¹	59.4	92.4	105.2	88.1	91.9	87.0	75.1	85.0	85.0	95.0	96.0	1.1%	1.7%	8.3%
Canada	15.0	20.0	25.0	24.0	20.0	30.0	30.0	30.0	40.0	40.0	40.0	-	4.0%	3.4%
China	450.0	700.0	800.0	820.0	750.0	780.0	780.0	780.0	625.0	630.0	700.0	11.1%	-0.3%	60.2%
India ²	124.6	115.7	153.3	134.7	146.4	116.7	134.6	122.4	35.0	35.0	35.0	-	-11.4%	3.0%
Madagascar	3.4	3.8	3.6	2.9	4.3	5.3	8.1	9.2	13.3	48.1	48.1	-	25.6%	4.1%
Mexico	5.1	6.6	7.3	7.5	7.0	9.2	6.5	3.8	1.7	4.2	4.2	-	-5.3%	0.4%
Mozambique	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	104.0	153.0	47.1%	n/a	13.2%
Russian Federation	14.0	7.7	20.7	14.3	20.2	17.6	15.9	19.4	25.2	17.8	16.6	-6.7%	2.4%	1.4%
Sri Lanka	3.2	3.4	3.4	4.2	3.1	4.0	4.2	4.0	3.5	4.0	4.0	-	-4.9%	0.3%
Ukraine	4.3	2.8	0.6	4.6	6.9	13.8	14.5	14.6	14.9	15.0	15.0	-	2.9%	1.3%
Zimbabwe	2.5	4.0	7.0	6.0	4.0	7.0	7.0	6.0	1.6	2.0	2.0	-	-9.0%	0.2%
Rest of World	58.5	24.7	25.2	49.7	51.6	37.1	22.8	21.6	22.9	44.4	48.4	9.1%	0.9%	4.2%
Total World	740.0	881.1	1151.3	1156.1	1105.5	1107.7	1098.7	1096.1	868.4	1039.5	1162.3	11.8%	0.7%	100.0%

¹Including beneficiated and directly shipped material.

²Run of the mine.

*Less than 0.05%.

Sources: includes data from US Geological Survey, British Geological Survey © UKRI and World Mining Data.

Rare earth metals production

Mine production

Thousand tonnes ¹											Growth rate per annum			Share 2019
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2008-18		
Australia	-	-	2.2	3.2	1.3	6.2	11.9	13.9	17.3	18.6	17.6	-5.1%	n/a	8.4%
Brazil	0.2	0.1	0.1	1.6	0.3	-	0.9	2.2	1.7	1.1	1.0	-9.1%	9.1%	0.5%
China	129.0	82.2	93.8	93.8	93.8	105.0	105.0	105.0	120.0	120.0	132.0	10.0%	-4.4%	63.0%
India	†	n/a	n/a	n/a	0.3	1.7	1.0	1.5	1.5	2.9	3.0	-3.4%	62.9%	1.4%
Malaysia	†	0.4	0.4	0.1	0.2	0.2	0.3	1.9	0.3	0.1	0.1	-	-3.3%	•
Russian Federation	1.9	1.5	1.4	2.1	1.4	2.1	2.3	3.1	2.5	2.6	2.6	-	0.5%	1.2%
Thailand	4.0	5.6	3.1	0.1	0.1	1.9	0.8	1.6	1.3	-	-	n/a	n/a	-
US	-	-	-	3.0	5.5	5.4	5.9	-	-	18.0	26.0	44.4%	n/a	12.4%
Rest of World	-	0.2	0.2	0.2	0.1	-	0.3	0.2	0.3	23.9	27.3	14.1%	n/a	13.0%
Total World	135.1	97.0	101.3	104.2	103.0	122.6	128.3	129.4	129.8	187.2	209.6	12.0%	3.9%	100.0%

¹Thousand tonnes of rare earth oxide equivalent.

†Less than 0.05.

*Less than 0.05%.

n/a not available.

Sources: includes data from US Geological Survey, British Geological Survey © UKRI and World Mining Data.

Reserves of key minerals

Cobalt reserves

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

Natural graphite reserves

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

Lithium reserves

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

Rare earth metals reserves

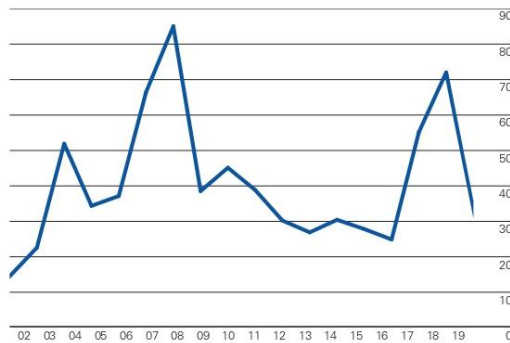
Thousand tonnes	At end of 2019	Share	R/P ratio
Australia	3300	2.7%	187
Brazil	22000	17.7%	22000
China	44000	35.4%	333
India	6900	5.5%	2300
Malaysia	30	*	349
Russian Federation	20695	16.6%	7960
Thailand	890	0.7%	n/a
US	1400	1.1%	54
Rest of World*	25120	20.2%	920
Total World	124335	100.0%	593

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

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

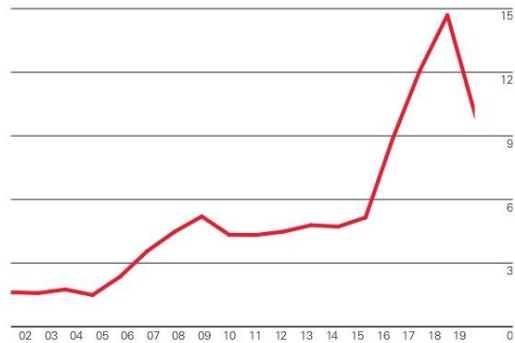
Cobalt prices

Thousands of US dollars per tonne*



Lithium carbonate prices

Thousands of US dollars per tonne*



*2000-2012 spot grade for cathodes, source US Geological Survey. Data from 2013 onwards: min purity 99.8%, source London Metal Exchange.
†2000-2008 unit value, data series 140, source US Geological Survey. Data from 2009 onwards: FOB South America, source Benchmark Mineral Intelligence.

Appendices

Approximate conversion factors

Crude oil*

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

*Based on worldwide average gravity.

Products

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

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

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

Methodology

Methodology for converting non-fossil electricity generation to primary energy

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

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

1965-2000: assumed constant efficiency of 36%

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

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

The table below quantifies these assumptions:

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

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

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

Units

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

Calorific equivalents

One exajoule equals approximately:

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

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

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

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

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

Percentages

Calculated before rounding of actuals.

Rounding differences

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

Tonnes

Metric equivalent of tons.

Definitions

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

Country, regions and geographic groupings

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

North America

US (excluding US territories), Canada, Mexico.

South & Central America

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

Europe

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

Commonwealth of Independent States (CIS)

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

Middle East

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

North Africa

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

West Africa

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

East and Southern Africa

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

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.

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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.
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 Clean Cooking Alliance (CCA)
 Climate Action Network International (CAN-I)
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REN21 is the only **global community** of renewable energy actors from science, academia, governments, NGOs and industry. We provide up-to-date facts, figures and peer-reviewed analysis of global developments in technology, policies and markets to decision makers. Our goal: encourage and enable them to make the shift to renewable energy happen – now!



The most successful organisms, such as an octopus, have a **decentralised intelligence** and "sensing" function. This increases responsiveness to a changing environment. REN21 incarnates this approach.



Our more than **2,000 community members** guide our co-operative work. They reflect the vast array of backgrounds and perspectives in society. As REN21's eyes and ears, they collect information and share intelligence, by sending input and feedback. REN21 takes all this information to better understand the current thinking around renewables and change norms. We also use this information to connect and grow the energy debate with non-energy players.



Our annual publication, the *Renewables Global Status Report*, is probably the world's most comprehensive crowdsourced report on renewables. It is a truly collaborative process of co-authoring, data collection and peer reviewing.

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REN21 is committed to mobilising global action to meet the United Nations Sustainable Development Goals.



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Together with REN21's annual **Renewables Global Status Report (GSR)**, these two publications provide a comprehensive overview of developments in the renewable energy sector. The 2020 GTR edition was supported by the German Federal Ministry of Environment, Nature Conservation and Nuclear Safety. It was released in May 2020 and can be downloaded at www.fs-unep-centre.org.



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ACKNOWLEDGEMENTS

REN21 RESEARCH DIRECTION TEAM

Hannah E. Murdock
Duncan Gibb
Thomas André

SPECIAL ADVISORS

Janet L. Sawin (Sunna Research)
Adam Brown

CHAPTER AUTHORS

Thomas André (REN21)
Fabiani Appavou
Adam Brown
Geraint Ellis (Queen's University Belfast)
Bärbel Epp (Solrico)
Duncan Gibb (REN21)
Flávia Guerra
Fanny Joubert (EcoTraders)
Ron Kamara (EcoTraders)
Bozhil Kondev
Rachele Levin
Hannah E. Murdock (REN21)
Janet L. Sawin (Sunna Research)
Kristin Seyboth (KMS Research and Consulting LLC)
Jonathan Skeen (The SOLA Group)
Freyr Sverrisson (Sunna Research)
Glen Wright (Institute for Sustainable Development and International Relations)

RESEARCH AND PROJECT SUPPORT (REN21 SECRETARIAT)

Fiona Corcoran, Hend Yaqoob, Dalia Assoum,
Stephanie Gicquel, Vibhushree Hamirwasia,
Lea Ranalder, Katharina Satzinger

COMMUNICATIONS SUPPORT (REN21 SECRETARIAT)

Laura E. Williamson, Katherine Findlay,
Anna Swenson, Florencia Urbani
Sabine Froning, Niels Reise (Communication Works)

EDITING, DESIGN AND LAYOUT

Lisa Mastny, Editor
weeks.de Werbeagentur GmbH, Design

PRODUCTION

REN21 Secretariat, Paris, France

Note: Some individuals have contributed in more than one way to this report. To avoid listing contributors multiple times, they have been added to the group where they provided the most information. In most cases, the lead country, regional and topical contributors also participated in the Global Status Report (GSR) review and validation process.

SIDEBAR AUTHORS

Harold Anuta
(International Renewable Energy Agency – IRENA)
William Brent (Power for All)
Christopher Dent (Edge Hill University)
Rabia Ferroukhi (IRENA)
Celia Garcia (IRENA)
Arslan Khalid (IRENA)
Pablo Ralon (IRENA)
Michael Renner (IRENA)
Michael Taylor (IRENA)
Glen Wright (Institute for Sustainable Development and International Relations)

REGIONAL CONTRIBUTORS

CENTRAL AND EAST AFRICA

Allan Chege, Mark Hankins, Allan Kinuthia, Farhiya Tifow, Dorcas Wairimu (African Solar Designs); Fabrice Foudji Toche (Vista Organisation for Education and Social Development in Africa)

LATIN AMERICA AND CARIBBEAN

Aliosha Nicolás Behnisch, Gonzalo Bravo, Lucas Furlano, Ignacio Sagardoy (Fundación Bariloche); Peter Krenz (GIZ); Douglas Murphy (Inter-American Development Bank – IDB); Rodrigo Valdovinos (El Centro de Formación Técnica del Medio Ambiente – IDMA)

MIDDLE EAST AND NORTH AFRICA

Tarek Abdul Razek, Akram Almohamadi, Ehab Nayef Al Amleh, Kholoud Moustafa Bakry (Regional Center for Renewable Energy and Energy Efficiency – RCREEE)

SOUTHERN AFRICA

Joseph Ngwawi (Southern African Research and Documentation Centre)

ACKNOWLEDGEMENTS (continued)

LEAD COUNTRY CONTRIBUTORS

Algeria

Noureddine Yassaa (Commissariat for Renewable Energy and Energy Efficiency)

Australia

Veryan Hann (University of Tasmania); Charlotte Rouse (Australian Renewable Energy Agency); Amanda Scribante (Norton Rose Fulbright); Australian Photovoltaic Institute (APVI)

Brazil

Ricardo Lacerda Baitelo, Stephanie Fonseca Betz, Rodrigo Sauaia (Associação Brasileira de Energia Solar Fotovoltaica – ABSOLAR); Thiago Barral Ferreira (Energy Research Office); Marcela Vincoletto Rezende (Brazilian Biogas Association)

China

João Graça Gomes, Xu Huijin, Yang Qiang (China-UK Low Carbon College, Shanghai Jiao Tong University); Frank Haugwitz (Asia Europe Clean Energy (Solar) Advisory Co. Ltd. – AECEA); Haiyan Qin, Guiyong Yu, Hui Yu (Chinese Wind Energy Association – CWEA)

Chinese Taipei

Gloria Kuang-Jung Hsu (National Taiwan University)

Colombia

Yuri Ulianov Lopez

Denmark

Jakob Jensen (Heliac)

France

Romain Zissler (Renewable Energy Institute)

Germany

Sebastian Hermann (German Environment Agency); Sigrid Kusch-Brandt (University of Padua)

Greece

Ioannis Tspouridis (RED Pro Consultants)

Honduras

Lesvi Mariela Montoya, Tannia Vindel (Dirección Nacional de Planeamiento Energético y Política Energética Sectorial)

Hungary

Csaba Vaszko (Greenstreams)

India

Pallav Purohit (International Institute for Applied Systems Analysis – IIASA); Yogesh Kumar Singh (National Institute of Solar Energy)

Indonesia

Chayun Budiono (PT Gerbang Multindo Nusantara)

Iran

Mohammadhosein Seyyedani (SAMANIR)

Japan

Hironao Matsubara (Institute for Sustainable Energy Policies); Naoko Matsumoto (Ferris University Japan)

Jordan

Samer Zawaydeh (Association of Energy Engineers)

Kazakhstan

Timur Shalabayev (Solar Power Association of Qazaqstan)

Kenya

Eromosele Omomhenle (Microsoft Corporation)

Korea, Republic of

Seong Ho Lee (Korea Institute of Energy Technology Evaluation and Planning); Nikola Medimorec (SLOCAT Partnership for Sustainable, Low Carbon Transport)

Libya

Mariam El Forgani (General Electric Company of Libya)

Mexico

Gabriela Hernández-Luna (Engineering and Applied Science Center Research (CIICAp) of Autonomous University of Morelos State – UAEM); Philip Russell (Mexico Energy News)

Mongolia

Myagmardorj Enkhmend (Mongolian Renewables Industries Association)

Nepal

Kushal Gurung (WindPower Nepal)

Nigeria

Adedoyin Adeleke (International Support Network for African Development); Norbert Edomah (Pan-Atlantic University); Anayo Ezeamama (Brandenburg University of Technology, Cottbus-Senftenberg, Germany); Austine Sadiq Okoh (Global Environment Services and Weather Solutions); Abdulhameed Babatunde Owolabi (Institute for Global Climate Change and Energy, Department of Climate Change, Kyungpook National University, Republic of Korea)

Portugal

Madalena Lacerda, Susana Seródio (Portuguese Renewable Energy Association – APREN)

Russian Federation

Georgy Ermolenko (Institute for Energy of National Research University Higher School of Economics)

Spain

Gonzalo Martín (Protermosolar); Silvia Vera (Institute for Diversification and Saving of Energy – IDAE); Unión Española Fotovoltaica (UNEF)

Suriname

Jordi Abadal (IDB)

Turkey

Yael Taranto (SHURA Energy Transition Center); Tanay Sidi Vyar (Marmara University)

Ukraine

Andriy Konechenkov (Ukrainian Wind Energy Association); Galyna Trypolska (Institute for Economics and Forecasting, National Academy of Sciences of Ukraine)

Uruguay

Uruguay Ministry of Industry, Energy and Mining – MIEM; Federico Sanz (Universidad Tecnológica); Wilson Sierra (MIEM)

Uzbekistan

Nizomiddin Rakhmanov (Tashkent State Technical University)

Vietnam

Dang Anh Thi Nguyen (Consultant)

LEAD TOPICAL CONTRIBUTORS

BIOENERGY

Cristina Calderon, Martin Colla
(Bioenergy Europe)

BUILDINGS

Matthew Black, Catriona Brady
(World Green Building Council);
Christina Hageneder (GIZ); Ursula
Hartenberger (Royal Institute of
Chartered Surveyors); Maxine Jordan
(International Energy Agency – IEA);
Edward Mazria (Architecture 2030);
Régis Meyer (Ministère de la Transition
Ecologique et Solidaire); Oliver Rapf
(Buildings Performance Institute of
Europe – BPIE); Nora Steurer (Global
Alliance for Buildings and Construction,
United Nations Environment Programme
– UNEP)

DISTRIBUTED RENEWABLES FOR ENERGY ACCESS

Advisor: Divyam Nagpal; Shrikant Avi, Asna
Towfiq (Clean Cooking Alliance); Juliette
Besnard (Energy Sector Management
Assistance Program – ESMAP); William
Brent (Power for All); Kelly Brinkler; Ute
Collier (Practical Action); Nazik Elhassan,
Adrian Whiteman (IRENA); Silvia Francioso
(GOGLA); Peter George (Clean Cooking
Alliance); Jens Jaeger, David Lecoque (ARE);
Takehiro Kawahara (BloombergNEF);
Daniel Kitwa (Africa Mini-grid Developers
Association – AMDA); Wim Jonker Klunne
(Consultant); Bonsuk Koo (ESMAP); Benjamin
Lasne-Laverne, Baptiste Posseme (Infinergia
Consulting); Marcos Paya (Dalberg Advisors);
Ruchi Soni (Sustainable Energy for All); Yann
Tanvez (International Finance Corporation)

ENERGY EFFICIENCY

Advisor: Freyr Sverrisson (Sunna Research);
Dusan Jakovljevic (Energy Efficiency in
Industrial Processes); Rod Janssen (Energy
in Demand); Benoît Lebot (Ministère de la
Transition Ecologique et Solidaire)

ENERGY STORAGE

Andy Bradley (Delta Energy and
Environment)

ENERGY SYSTEMS

INTEGRATION

Julien Armijo (IEA); Virginia Echinope
(Uruguay MIEM); Thierry Lepercq
(Soladvent); Luke Middleton (Hydro
Tasmania); Simon Mueller (Enertrag);
Cédric Philibert (Consultant)

GEOTHERMAL POWER AND HEAT

Marit Brommer; Margaret Krieger
(International Geothermal Association)

GLOBAL OVERVIEW

Data Advisor: Duncan Millard; Rana Adib
(REN21); Zuzana Dobrotkova (World
Bank); Bruce Douglas (Eurelectric); Rana
Ghoneim (United Nations Industrial
Development Organization – UNIDO);
Flávia Guerra; Guillaume Joly (Région Île-
de-France); Tomas Kåberger (Renewable
Energy Institute); Ruud Kempener
(European Commission, Renewable
Energy Policy Unit); Hugo Lucas (Spanish
Ministry for Ecological Transition and
Demographic Challenge); Tanguy Tomes;
Arthouros Zervos (National Technical
University of Athens)

HEAT PUMPS

Thomas Nowak (European Heat Pump
Association); Cooper Zhao (China Heat
Pump Association)

HEATING AND COOLING

François Briens (IEA); Valérie Laplagne
(Uniclima); Richard Lowes (University
of Exeter); Peter Lundberg (Asia Pacific
Urban Energy Association); Lindsay
Sugden (Delta Energy and Environment);
Paul Voss (Euroheat & Power); Werner
Weiss (AEE Institute for Sustainable
Technologies – AEE INTEC)

HYDROPOWER

Cristina Diez Santos (International
Hydropower Association)

INVESTMENT

Françoise d'Estais (UNEP); Malin
Emmerich, Christine Gruening (Frankfurt
School of Finance and Management);
Rob Macquarie (Climate Policy Initiative);
Angus McCrone (BloombergNEF)

OCEAN ENERGY

Advisor: Freyr Sverrisson (Sunna
Research)

POLICY

Advisor: Evan Musolino; Rachel
Anderson, Valerie Bennett (Ontario
Energy Board); Diala Hawila (IRENA);
Nurzat Myrsaliev (UNIDO)

PUBLIC SUPPORT

Zoé Chateau (University of Exeter);
Nick Johnston, Robert Wade (Queen's
University Belfast); Dorina Luga
(WindEurope); Cristian Pons-seres de
Brauwer (Danish Technical University);
Aida Volkmer (University College Cork)

SOLAR PHOTOVOLTAICS

Alice Detollenaere (Becquerel Institute);
Denis Lenardič (pvresources);
Gaëtan Masson (Becquerel Institute;
IEA Photovoltaic Power Systems
Programme); Paula Mints (SPV Market
Research); Dave Renné (International
Solar Energy Society); Michael Schmela
(SolarPower Europe)

SOLAR THERMAL HEATING AND COOLING

Hongzhi Cheng (Sun's Vision); Pedro Dias
(Solar Heat Europe); Monika Spörk-Dür
(AEE INTEC); He Tao, Ruicheng Zheng
(China Academy of Building Research)

TRANSPORT

Geert Decock (European Federation
for Transport and Environment); Marine
Gorner, Pierre Leduc, Leonardo Paoli,
Jacob Teter (IEA); Cornie Huizenga
(Climate and Environment Services
Group – CESG); Nikola Medimorec,
Karl Peet (SLOCAT); Patrick Oliva (Paris
Process on Mobility and Climate); Zifei
Yang (International Council on Clean
Transportation – ICCT)

WIND POWER

Feng Zhao (Global Wind Energy Council
– GWEC); American Wind Energy
Association; Stefan Gsänger, Jean-
Daniel Pitteloud (World Wind Energy
Association – WWEA); Ivan Komusanac
(WindEurope)

ACKNOWLEDGEMENTS (continued)

PEER REVIEWERS AND OTHER CONTRIBUTORS

Emma Aberg (IRENA); Abdullah Abou Ali (IRENA); Diego Acevedo (Eneda Engineering VBA); Abdenour Achour (Chalmers University of Technology); Gavin Allwright (International Windship Association); Mohammad Alnajideen (Cardiff School of Engineering, Cardiff University); Angelica Venancio Apilado (Asian Development Bank – ADB); Abdelkader Baccouche (Tunisia National Agency for Energy Management – ANME); Miriam Badino; Sarah Baird (Let There Be Light International); Jake Bartell (Strategen Consulting); Emanuele Bianco (IRENA); Rakesh Bohra (Infosys Limited); Emilio Soberón Bravo (Mexico Low Emission Development Program (MLED-II) of the US Agency for International Development); Luis Carlos (Geoconsul, SA de CV); Sergio Castellanos (University of California at Berkeley); Sandra Chavez (World Bank); Jordi Abadal Colomina (IDB); Jack Corscadden (Euroheat & Power); Edgar Cruz (Climate Finance Solutions); Ruud Cuyper (TNO); Mark Diesendorf (Institute of Environmental Studies, University of New South Wales); Abdelnaser Dwaikat (Association of Energy Engineers, State of Palestine); Tobias Engelmeier (TFE Consulting GmbH); Ashkan Etemad (LEEDinIran); Pablo Ferragut (ARPEL); David Ferrari (United Nations Environment and Social Committee for Asia and the Pacific); Lara Ferreira (APREN); Panagiotis Fragkos (E3Modelling); Sabine Froning (Communication Works); Daniel Garcia (Famerac); Tony Gebrayel (Lebanese Center for Energy Conservation); Marine Gomer (IEA); Dean Granoff; Carlos Guadarrama (IRENA); Jonathan Guerrero (Independent Researcher); Ken Guthrie (Sustainable Energy Transformation); Daniel S. Helman (College of Micronesia FSM); John Hensley (AWEA); Sebastian Hermann (Germany Environment Agency); Martin Hiller (Millwater Partners); Rainer Hinrichs-Rahlwes (European Renewable Energy Federation); Tom Fred Ishugah (East African Centre for Renewable Energy and Energy Efficiency); Arnulf Jaeger-Waldau (European Commission, Joint Research Centre); Jakob Jensen (Heliac); Danielle Johann (ABRASOL); Panayiotis Kastanias (Cyprus Employers and Industrialists Federation); Shorai Kavu (Ministry of Energy and Power Development, Zimbabwe); Nazar Khan (Jamia Millia Islamia); Birol Kilkis (World Alliance for Decentralized Energy); Karin Kritzing (Stellenbosch University); Amit Kumar (The Energy and Resources Institute); Nilto Labah-Niemeyer (Deloitte Consulting); Mercè Labordena (SolarPower Europe); Maryse Labriet (ENERIS); Alexandra Langenheld (Agora Energiewende); Eva Lee (Power for All); Andrea Liesen (BSW Solar); Melisande F. Liu (Civic Foundation UNISON); Joshua Loughman (Arizona State University); Detlef Loy (Loy Energy Consulting); Romain Mauger (University of Groningen); Jaideep Malaviya (Solar Thermal Federation of India); Sabatha Mthwecu (Solar Rais); Julia Muench (Fachverband Biogas e.V.); Sumoni Mukherjee; Rachel Muncrief (ICCT); Federico Musazzi (Anima); Kee-Yung Nam (ADB); Les Nelson (International Association of Plumbing and Mechanical Officials); Daya Ram Nhuchhen (University of Calgary); Eduardo Noboa (World Future Council); Laura Noriega (ICLEI); Irene di Padua (Solar Heat Europe); Eitan Parnass (Green Energy Association of Israel); Nahasi Pascal; Pascual Polo (Asociación Solar de la Industria Térmica); Ramesh Poluru (The INCLEN Trust International); Edwige Porcheyre (Enerplan); Luka Powanga (Regis University/Energy Africa Conference); Pallav Purohit (IIASA); Liming Qiao (GWEC); Robert Rapier (ZHRO, LLC); Atul Raturi (University of the South Pacific School of Engineering and Physics, Faculty of Science, Technology and Environment); Olivier Renvoisé (Engie Digital); Carlos Reviero (ComAp); Clare G. Richardson-Barlow (University of Leeds); Andres Rios (Renewable Energy Expert); Ahmed Rontas (DOLUS); Heather Rosmarin (InterAmerican Clean Energy Institute); Felipe Sabadini (RWTH Aachen University); David Mensah Sackey (Green Communities International); Kumiko Saito (Solar System Development Association); Amit Saraogi (Oorja: Empowering Rural Communities); Miguel Schloss (Surinvest Ltd.); Beatrix Schmuelling (Ministry of Climate Change and Environment, United Arab Emirates); Gal Shofrony (Israeli Electricity Authority); Eli Shilton (Elsol); Wilson Sierra (MIEM); Nilmini Silva-Send (Energy Policy Initiatives Centre); Manoj Kumar Singh (Idam Infrastructure Advisory Services); Laiz Souto (University of Girona); Janusz Starosciak (Association of Manufacturers and Importers of Heating Appliances – SPIUG); David Stickelberger (Swissolar); Geoff Stiles (Carbon Impact Consultants); Costanza Strinati (IRENA); Yael Taranto (SHURA Energy Transition Center); Ian Thomson (Advanced Biofuels Canada); Charity Lao Torregosa (ADB); Costas Travarasos (Greek Solar Industry Association – EBHE); Daniel Trier (Enerplan); Andreas Ulbig (Adaptricity); Kutay Ülke (Bural); Celeste Wanner (AWEA); Laura Waterford (Norton Rose Fulbright); Sheila Watson (FIA Foundation); Harish Yadav (Awake); Peter Jianhua Yang (Case Western Reserve University); Abdulmutalib Yussuff (University of Edinburgh); Monica Zamora Zapata (University of California, San Diego); Vladislav Zavadskiy (Almaty University of Power Engineering and Telecommunications); Yongping Zhai (ADB); Shuwei Zhang (Drawworld Environment Research Center)

FOREWORD

Every year, we launch the *Renewables Global Status Report* (GSR) to present the latest data and facts on renewable energy policies, markets and investments. This year, however, something is different. We collectively witnessed the adoption of immediate and drastic measures in response to the COVID-19 pandemic. Ensuing lockdowns and economic consequences have disrupted everyone's lives.

Time seems to be separated into a pre-COVID and a post-COVID period. Energy supply and demand have been disrupted, and carbon dioxide emissions fell. In such unprecedented times, stepping back to look at what happened in the renewable energy sector in 2019 may seem counterintuitive. But we need to do this.

It's clear that we need to study the global picture with a long-term view to make the right decisions going forward. If we don't, we risk getting sidetracked by a short-term perspective. As disruptive as COVID-19 has been, the crisis does not alter observable trends in the energy sector that have persisted for years. The truth remains: we need to enact a structural shift built on an efficient and renewable-based energy system if we want to decarbonise our economies.

Many of the same themes from prior years resurfaced again in GSR 2020. Year after year, we have reported success in the renewable power sector. And year after year, we have reported that renewables lag in other end-use sectors like heating, cooling and transport, and that these sectors suffer a lack of policy support. We need to report about successes as well as take a more critical look at areas where progress is weak, to enable better decision making and advance the uptake of renewables.

In the effort not only to provide accurate data but also to advance renewables in areas of weaker historic progress, GSR 2020 is different from former editions. Rather than only tracking support for renewables broadly, we decided to actively address the disconnect in progress among sectors. You will find some new figures and the start of ongoing data tracking on renewable energy policies, generation and use in different end-use sectors. We hope that this more specific look at each end-use sector (Buildings, Industry and Transport) will provide information needed to make better decisions.

At the halfway point of 2020, we find ourselves in a period of global flux. We are also in a moment of increasing consciousness: public support for renewables is at an all-time high, and many people are becoming more aware of the various benefits of renewable energy. Let's seize this unique moment to create lasting policies, regulations and targets, and an environment that enables the switch to an efficient and renewable-based energy system. Globally. Now.

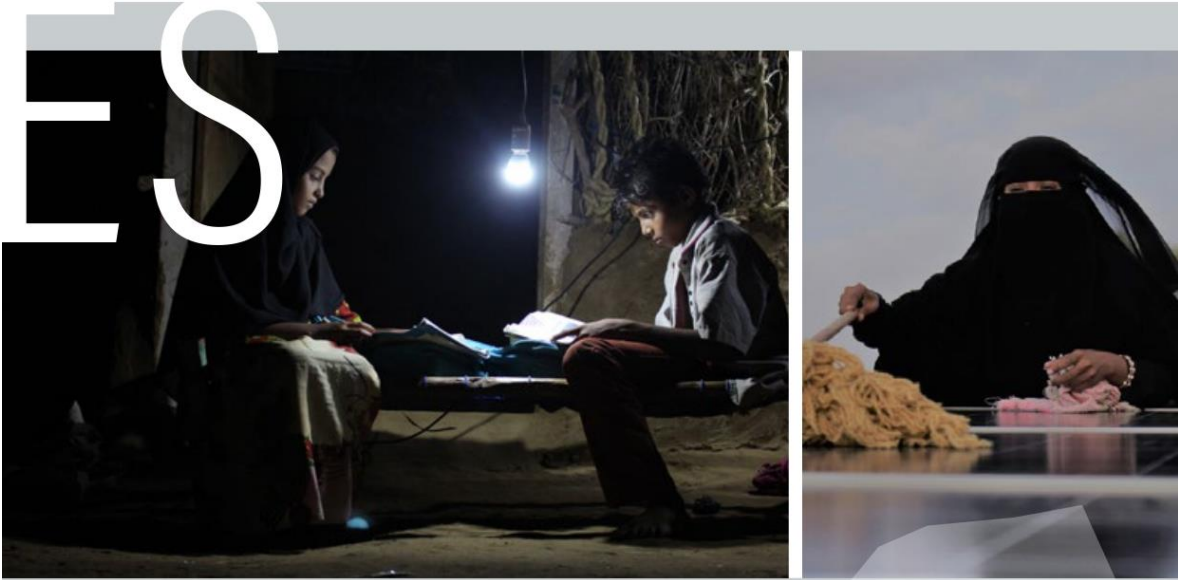
Some things don't change, even after COVID-19. As with all REN21 publications, GSR 2020 is the product of a collaborative process built from an international community of renewable energy contributors, researchers and authors. This year's report consolidates data from more than 350 experts to provide an up-to-date snapshot of the state of play of renewables. On behalf of the REN21 Secretariat, I would like to thank all those who contributed to the successful production of GSR 2020. Particular thanks go to the REN21 Research Direction Team of Hannah E. Murdock, Duncan Gibb and Thomas André; Special Advisors Janet L. Sawin and Adam Brown; the chapter authors; our editor Lisa Mastny; and the entire team at the REN21 Secretariat.

We sincerely hope that GSR 2020 will contribute to important changes in the near future.



Rana Adib
Executive Director, REN21

June 2020



 **RENEWABLES
PROVIDING
BASIC SERVICES
TO COMMUNITIES,
YEMEN**



Conflict in Yemen has resulted in significant loss of life, forced people from their homes and hindered the provision of basic services. The Enhanced Rural Resilience in Yemen Programme (ERRY) helps rural communities better cope with the crisis by increasing their access to energy through renewable technologies, such as solar lanterns to light homes, businesses and schools; solar-powered refrigerators for vaccine storage in health facilities; solar-powered water systems to provide safe drinking water in cholera-affected locations; and solar irrigation pumps for small-scale farmers.

EXECUTIVE SUMMARY

01 GLOBAL OVERVIEW

Renewables grew rapidly in the power sector, while far fewer advances have occurred in heating and transport.

Renewable energy had another record-breaking year in 2019ⁱ, as installed power capacity grew more than 200 gigawatts (GW) – its largest increase ever. Capacity installations and investment continued to spread to all corners of the world, and distributed renewable energy systems provided additional households in developing and emerging countries with access to electricity and clean cooking services. Also during the year, the private sector signed power purchase agreements (PPAs) for a record amount of renewable power capacity, driven mainly by ongoing cost reductions in some technologies.

Shares of renewables in electricity generation continued to rise around the world. In some countries, the share of renewables in heating, cooling and transport also grew, although these sectors continued to lag far behind due to insufficient policy support and slow developments in new technologies. This resulted in only a moderate increase in the overall share of renewables in total final energy consumption (TFEC), despite significant progress in the power sector.

As of 2018, modern renewable energy (excluding the traditional use of biomass) accounted for an estimated 11% of TFEC, only a slight increase from 9.6% in 2013. The highest share of renewable energy use (26.4%) was in electrical uses excluding heating, cooling and transport; however, these end-uses accounted for only 17% of TFEC in 2017. Energy use for

transport represented some 32% of TFEC and had a low share of renewables (3.3%), while the remaining thermal energy uses accounted for more than half of TFEC, of which 10.1% was supplied by renewables. Overall, the slow growth in the renewable energy share of TFEC indicated the complementary roles of energy efficiency and renewables in reducing the contribution of fossil fuels in meeting global energy needs.

Among the general public, support for renewable energy continued to advance alongside rising awareness of the multiple benefits of renewables, including reduction of carbon dioxide (CO₂) and other greenhouse gas emissions.

Governments around the world have stepped up their climate ambitions, and by year's end 1,480 jurisdictions – spanning 28 countries and covering 820 million citizens – had issued “climate emergency” declarations, many of which were accompanied by plans and targets to transition to more renewable-based energy systems.

At the same time, while some countries were phasing out coal, others continued to invest in new coal-fired power plants, both domestically and abroad. In addition, funding from private banks for fossil fuel projects has increased each year since the signing of the Paris Agreement in 2015, totalling USD 2.7 trillion between 2016 and 2019. Although energy-related CO₂ emissions remained stable in 2019, the world is not on track to limit global warming to well below 2 degrees Celsius (°C), let alone 1.5 °C, as stipulated in the Paris Agreement.

ⁱ The *Renewables 2020 Global Status Report* focuses on developments in renewable energy in 2019, and therefore does not reflect the impact of the COVID-19 pandemic on global energy systems. For immediate impacts on the renewable energy sector as of mid-2020, see Sidebar 1. An overview of the full impacts of the COVID-19 crisis on the sector will be included in GSR 2021.

BUILDINGS

Renewables were the fastest growing energy source in buildings, yet this increase was limited by lack of policy support.

Renewable energy met less than 14% of total energy demand in buildings in 2017. More than three-quarters of global final energy demand in buildings was for heating and cooling end-uses, which remain heavily fossil-fuel based. In 2018, renewables contributed an estimated 10.1% of heating and cooling demand in buildings; this share has barely risen from 8% in 2010. Modern bioenergy still represented the largest renewable heat source in the buildings sector, followed by renewable electricity for heat, solar thermal and geothermal heat. Most of the share increase was due to growth in renewable electricity for heat and in solar thermal, while use of modern bioenergy has remained stable. The majority of renewable electricity in buildings was provided by utility-scale, grid-connected renewables with a growing share from rooftop solar photovoltaic (PV) systems.

Direct policy action to stimulate renewable energy uptake in buildings was lacking in 2019, although more local and national governments introduced bans on fossil fuels for heating. Global efforts to decarbonise buildings through net zero carbon / net zero energy buildings are promoting the uptake of renewable energy in the sector.

Although renewable electricity saw strong growth, it was not enough to account for global increases in
final energy demand.



INDUSTRY

The share of renewables in industrial energy use remains small, particularly in sectors that require high process temperatures.

Renewable energy met around 14.5% of industrial final energy demand, with bioenergy supplying more than half of the renewable share. Bioenergy was used primarily in sub-sectors that utilise low-temperature heat (below 100 °C), such as pulp and paper. Solar thermal and geothermal heat were used mainly for pre-heating water, drying and generating low-temperature steam in industries such as mining, food and beverage production, textiles and agriculture. Within the industrial sector, the most energy-intensive sub-sectors – those with the highest process temperatures – also use the lowest shares of renewable energy.

Renewable electricity was used to supply both electrical and thermal demands of some industrial processes. New projects were completed or announced in 2019 to use renewable electricity to produce steel and cement and to power mining operations. In addition, projects were commissioned to produce renewable hydrogen for industry, and companies announced plans and intentions to produce renewable hydrogen from offshore wind power.



TRANSPORT

Despite gains in energy efficiency and continued growth in both biofuels and electric vehicles (EVs), transport remains the sector with the lowest share of renewable energy.

Although it accounts for around one-third of TFEC, transport remained the sector with the lowest share of renewable energy, at only 3.3%. The vast majority of global transport energy needs were met by oil and petroleum products, with small shares met by biofuels and renewable electricity. Gains in energy efficiency and continued growth in both biofuels and EVs were largely offset by rising energy demand in transport. Biofuels remained by far the largest contributor of renewable energy to the transport sector in 2019.

Although rarely linked directly to renewable sources, EVs became more commonplace in more countries as a result of policies and targets adopted in prior years. With cities increasingly restricting the circulation of fossil fuel vehicles, new mobility service companies have expanded rapidly, with some committing to using renewable electricity in their EV fleets. Some regions also saw gradual increases in the use of renewable hydrogen and renewable synthetic fuels for transport, but these remained minimal overall. Many countries still lack a holistic strategy for decarbonising transport. Although positive developments occurred across transport modes, including in road freight, shipping and aviation in 2019, progress has been too slow to achieve global climate targets.



POWER

The renewable power sector experienced record-high increases in installed capacity, outpacing net installations in fossil fuel and nuclear power combined.

Installed renewable power capacity grew more than 200 GW in 2019 (mostly solar PV), the largest increase ever. For the fifth year in a row, net additions of renewable power generation capacity clearly outpaced net installations of fossil fuel and nuclear power capacity combined. Globally, 32 countries had at least 10 GW of renewable power capacity in 2019, up from only 19 countries a decade earlier. In most countries, producing electricity from wind and solar PV is now more cost effective than generating it from new coal-fired power plants. These cost declines have led to record-low bids in tendering processes, which became even more common during the year. However, competitive auctions have led to consolidation in some industries and have favoured larger multinational energy companies rather than smaller actors, including community-led groups.

Overall, installed renewable energy capacity was enough to provide an estimated 27.3% of global electricity generation by the end of 2019. Despite these advances, renewable electricity continued to face challenges in achieving a larger share of global electricity generation, due in part to persistent investment in fossil fuel (and nuclear) power capacity.



02 POLICY LANDSCAPE

In 2019, policy frameworks continued to evolve in response to changes in renewable energy technologies and markets.

Much of the progress in developing and deploying renewable energy technologies has been achieved thanks to effective government policies. Policy continues to be important to overcome economic, technical and institutional barriers. By the end of 2019, nearly all countries had renewable energy support policies in place, although with varying degrees of ambition, scope and comprehensiveness. Jurisdictions have adapted policies to meet their specific circumstances, including to support increasing renewable energy capacity and generation, to boost job creation, and to increase energy access and security. Trade policy also had an impact on the production, exchange and development of renewable energy products, as well as on renewable energy demand levels within specific countries.

CROSS-SECTORAL TARGETS AND POLICIES

Targets that align renewable energy policy across multiple levels of governance and multiple economic sectors remained rare in 2019.

Renewable energy policies typically are enacted at a single level of governance and tend to focus on a single end-use sector, although examples of integration and co-ordination are emerging. Co-ordinated policy efforts often are organised under energy or climate change strategies at the national or state/provincial level, such as those introduced in the Netherlands and Scotland during 2019.

Targets are a primary means of expressing commitment to renewable energy and have been aimed almost exclusively at the power (electricity) sector. By the end of 2019, 166 countries had renewable power targets, compared to 49 countries for heating and cooling and 46 for transport. Only a few countries adopted a cross-sectoral target during 2019, such as in Spain.



RENEWABLE ENERGY AND CLIMATE CHANGE POLICY

Climate change policies that directly or indirectly stimulate interest in renewables increased in 2019, spreading to new regions and reaching new levels of ambition.

In some jurisdictions, policies directly link climate change mitigation with the increased deployment of renewables – such as Costa Rica's economy-wide roadmap launched in 2019 to achieve net zero emissions by 2050. However, other climate policies – such as fossil fuel bans and phase-outs, greenhouse gas emissions targets, and carbon pricing and emissions trading systems – stimulate the uptake of renewables indirectly. By the end of 2019, at least 56 carbon pricing initiatives in 47 countries had been implemented (up from 54 initiatives in 45 countries in 2018, with the addition of Singapore and South Africa). Fourteen countries worldwide had a legally binding target for net zero emissions (while two countries have already achieved this target), and the European Commission proposed a European Green Deal to create the first carbon-neutral region by 2050.

HEATING AND COOLING POLICY

Despite the enormous potential for renewable energy in heating and cooling, the number of related policies for buildings increased only slightly, while such policies for industry remained scarce.

Policies supporting renewable heating and cooling in buildings grew minimally in 2019, and include renewable heating and cooling mandates, building energy codes, support for renewable district heating and cooling, support for renewable natural gas, financial incentives, net zero emissions standards and fossil fuel bans for heating. No new countries adopted renewable heat mandates for the second year in a row, but at least four countries (Austria, Denmark, Norway and the United Kingdom) adopted targets to fully or partially ban the use of fossil fuels in heating.

Renewable energy support policies for the industrial sector are more limited, and new or revised policies in this area remained scarce in 2019. Although not always specific to the industrial sector, some policy developments related to renewable hydrogen took place in 2019, particularly in Australia, New Zealand, and Europe, while policy focus on hydrogen elsewhere occurred without a direct link to renewables.

Effective policy support

has been key to the advancement of renewables in power, while heating and transport lag behind.

TRANSPORT POLICY

In the transport sector, no new countries adopted biofuel blend mandates, but some countries with existing mandates strengthened their policies. Policy attention to EVs expanded but still without a direct link to renewables.

In 2019, policies to promote renewable energy in the transport sector continued to focus primarily on road transport, which accounts for the vast majority of energy use in transport. Rail, aviation and shipping received less policy attention despite being large energy consumers.

As in previous years, biofuels were the primary focus of road transport policy frameworks. Although no new countries introduced biofuel blending mandates for the second year running (with the total remaining at 70 countries), some countries with existing mandates added new ones, and several existing mandates were strengthened. The number of countries with targets for advanced biofuels reached 24, although nearly all were targeting shares in the single digits.

Policies aimed at the electrification of transport, while not renewable energy policies in themselves, offer the potential for greater penetration of renewable electricity in the transport sector. In 2019, numerous jurisdictions implemented policies to support the increased uptake of electric road vehicles – including targets, financial incentives, public procurement and support for charging infrastructure. Targeted bans on fossil fuel vehicles were in place in at least 18 countries, up from 12 in 2018. Austria remained the only country that had a policy directly linking renewables with EVs, while only three cities had e-mobility targets that were directly linked to a renewable electricity target.

The private sector also advanced renewable energy initiatives in the transport sector, particularly for aviation, shipping and rail.



POWER POLICY

Countries continued to turn to competitive auctions and tenders to support large-scale, centralised renewable power projects; however, rising attention was paid to decentralised systems.

The power sector continued to receive the bulk of renewable energy policy attention in 2019, and targets remained the most popular form of intervention. Many countries used competitive auctions and tenders in lieu of feed-in policies for large-scale, centralised projects. At least 68 renewable energy auctions or tenders were held across at least 41 countries at the national or state/provincial level, down from 48 countries in 2018. However, the total number of countries that have used this mechanism increased to 109 (up from 98 in 2018) as new countries held tenders for the first time. African countries were very active in 2019, although to a lesser degree than in 2018. Feed-in policies were in place in 113 jurisdictions by the end of 2019, with no change from 2018.

The uptake of policies targeting small-scale, distributed renewable power generation accelerated during the year. These policies include solar mandates, feed-in pricing, net metering (and virtual net metering) and public utility policy. Policies also were adopted to encourage community energy arrangements, including measures promoting community choice aggregation and shared ownership of renewables, especially in Europe and the United States.

The private sector engaged in various forms of renewable power procurement, including through PPAs, renewable energy certificates, utility-led procurement programmes and self-generation.

POLICIES FOR SYSTEMS INTEGRATION OF VARIABLE RENEWABLE ELECTRICITY

A growing number of jurisdictions directed policies towards ensuring greater integration of variable renewable electricity (VRE).

The policy push for systems integration of renewables and enabling technologies, such as energy storage, remained focused on increasing power system flexibility and control, as well as grid resilience. Policies to advance the integration of VRE in 2019 were related mainly to market design, demand-side management, transmission and distribution system enhancements, grid interconnections and support for energy storage. Much of the policy development occurred in Europe and at the state level in the United States.

03 MARKET AND INDUSTRY TRENDS

BIOENERGY

Modern bioenergy provided 5.1% of total global final energy demand in 2018, accounting for around half of all renewable energy in final energy consumption.

The contribution of modern bioenergy to heat in industry has grown about 2% in recent years, while its use for heating in buildings (mainly in Europe and North America) has fallen slightly. Bioenergy provides around 9% of industrial heat demand and is concentrated in bio-based industries such as paper and board. Biofuels, mostly ethanol and biodiesel, provide around 3% of transport energy, and global biofuels production increased 5% in 2019. Ethanol production grew around 2%, despite a decline in the United States, the major ethanol producer. Biodiesel production increased 13%, and Indonesia became the world's largest producer, overtaking the United States, where production declined some 7%.

In the electricity sector, bioenergy's contribution rose 9% in 2019, to 501 terawatt-hours (TWh). China extended its lead as the largest country producer, and bio-electricity growth also was strong in the EU, Japan and the Republic of Korea.

Notable trends in the bioenergy industry included the continuing rise in wood pellet production, especially to serve growing markets in Japan and the Republic of Korea, and increasing investment in hydrotreated vegetable oil (HVO) production. Production of HVO/HEFA (hydroprocessed esters and fatty acids) increased 12% in 2019, and investments in numerous additional plants were announced.

Global biofuels
production
increased
5% in 2019.



GEOTHERMAL POWER AND HEAT

Geothermal electricity generation in 2019 totalled around 95 TWh, while direct useful thermal output reached around 117 TWh (421 petajoules).

An estimated 0.7 GW of new geothermal power generating capacity came online in 2019, bringing the global total to around 13.9 GW. As in 2018, Turkey and Indonesia led for new installations, followed closely by Kenya; together the three countries represented three-quarters of new installations globally. Other countries that added new geothermal power facilities (or added capacity at existing facilities) were Costa Rica, Japan, Mexico, the United States and Germany.

Direct use of geothermal energy for thermal applications has grown nearly 8% on average in recent years, with the fastest growing segment being space heating (around 13% annual growth). Among the most active markets are regions of Europe and China, the latter showing the fastest expansion. Just four countries – China, Turkey, Iceland and Japan – represented roughly 75% of all geothermal direct use in 2019.

As in many previous years, the global geothermal industry had mixed results. Construction activity and anticipation of further development remained intact in some key markets, but was largely predicated on government support. Elsewhere, the industry was inhibited by industry-specific challenges of high project costs and front-loaded project risks and by the corresponding lack of adequate funding and risk mitigation.

Continued research into new technologies and innovative processes and techniques, often supported by government programmes, helped fuel optimism for a path forward.

