The EU in the world - energy

Statistics Explained

Data extracted in January and February 2020.
Planned article update: February 2023.

" Among the G20 members, China and the United States were the largest producers of energy in 2017. "

" In Japan, South Korea, Turkey and the EU, more than half of energy needs in 2017 were met by imports. "

" Russia was the largest supplier of fossil fuels to the EU in 2018: 32% of petroleum products, 42% of solid fuels and 40% of natural gas. "

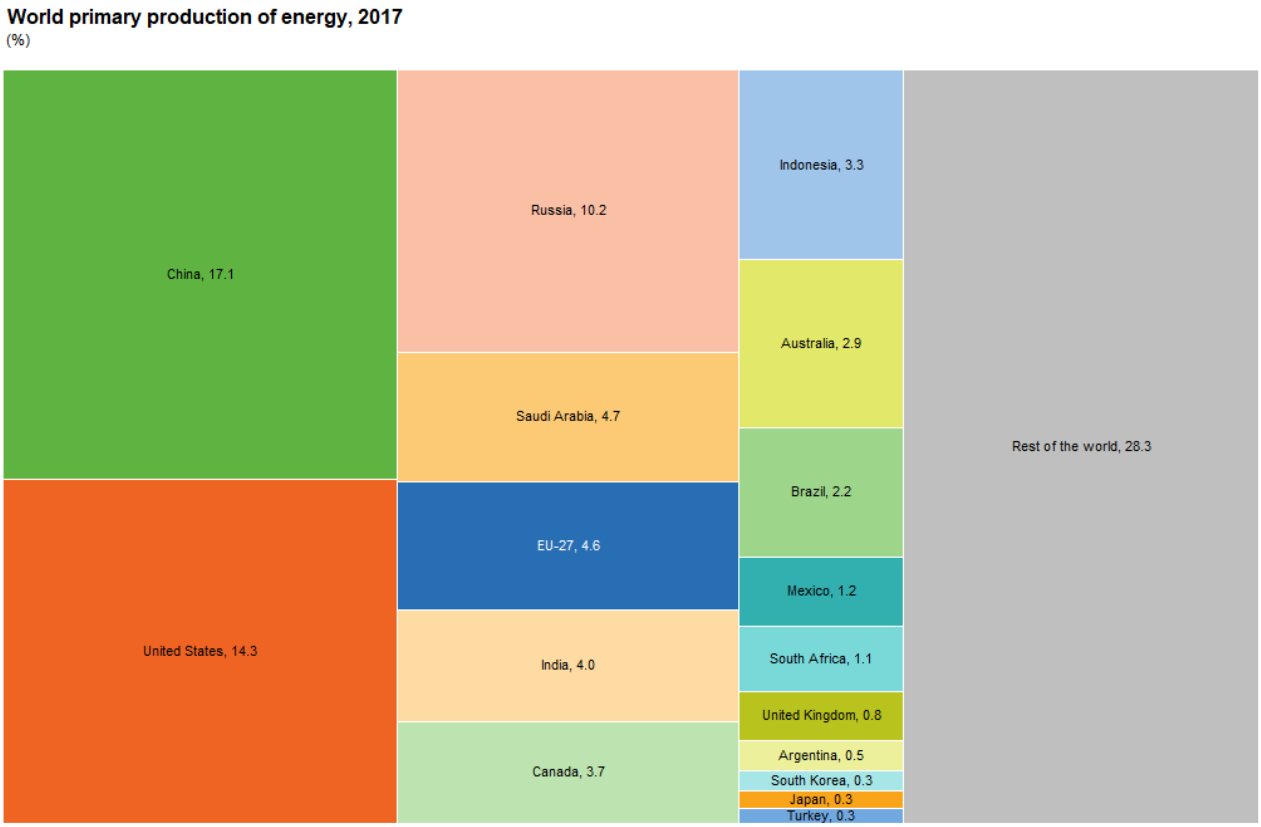
" China accounted for one quarter of worldwide electricity generation in 2017. "

This article is part of a set of statistical articles based on Eurostat's publication *The EU in the world 2020* . It focuses on energy statistics in the European Union (EU) and the 16 non-EU members of the Group of Twenty (G20) . The article covers key indicators on energy production and consumption and gives an insight into the EU's energy sector in comparison with (most of) the major economies in the rest of the world, such as its counterparts in the so-called Triad — Japan and the United States — and the BRICS composed of Brazil, Russia, India, China and South Africa.

Primary production

Primary production of energy is any extraction of energy products in a useable form from natural sources. This occurs either when natural sources are exploited (for example, in coal mines, crude oil fields, hydro power plants) or in the fabrication of biofuels. Primary production of energy in the EU-27 totalled 641 million tonnes of oil equivalent (toe) in 2017, while worldwide production reached 13.65 billion toe.

In 2017, the G20 members' share of the world total for primary production was 71.7 % (see Map 1). The EU-27's share of world production was 4.6 %. Among the G20 members, four recorded higher levels of production than the EU-27 as can be seen from Map 1: China's share of world primary energy production was 17.1 %, the United States' share was 14.3 %
and Russia's share was 10.2 %, while the 4.7 % share from Saudi Arabia was just above that recorded for the EU-27.



Map 1: World primary production of energy, 2017 (%) Source: Eurostat (nrg_bal_s) and the United Nations Department of Economic and Social Affairs, Statistics Division (Energy Statistics Yearbook and Energy Balances)

The sources of energy production in 2017 in the EU-27 were more balanced than in nearly all of the non-EU G20 members

Renewable energy sources are sources that replenish (or renew) themselves naturally and include biomass and renewable wastes, hydro power, geothermal energy, wind energy, solar energy, wave and tidal power. Non-renewable waste may be industrial or municipal waste.

For many of the G20 members, the mix of energy sources for primary production in 2017 was dominated by just one energy type (see Figure 1).

Crude oil was dominant in Saudi Arabia and Mexico, accounting for 85 % and 68 % of primary production respectively. In South Africa, 91 % of all primary production came from solid fuels (for example, coal and lignite), with this source accounting for more than half of production in China, Australia and Indonesia. In South Korea, nuclear energy contributed by far the largest share (79 %), and in Japan (after the suspension of the operation of many nuclear plants) the main source of primary production was renewables (55 %). Production in Turkey, Brazil and India was a mixture from renewables and waste as well as one type of fossil fuel: crude oil for Brazil and solid fuels for India and Turkey. By contrast, Argentina, Canada, Russia, the United Kingdom and the United States had substantial shares of production spread across two or three types of fossil fuels, with none of them accounting for more than half of their total production.

Primary production in the EU-27 was more varied than in nearly all of the other G20 members with only crude oil among the five types of energy sources shown in Figure 1 failing to attain at least a 10 % share of total production in 2017, while none of the other types of energy saw their share reach one third. Only the United States among the other G20 members reported production spread across four or five energy sources in a manner similar to that in the

EU-27, albeit more focused on fossil fuels. This varied pattern of primary energy production in the EU-27 reflects the availability of different fossil fuel deposits and the potential for hydro power among EU Member States as well as differing policies towards nuclear fuels and renewables.

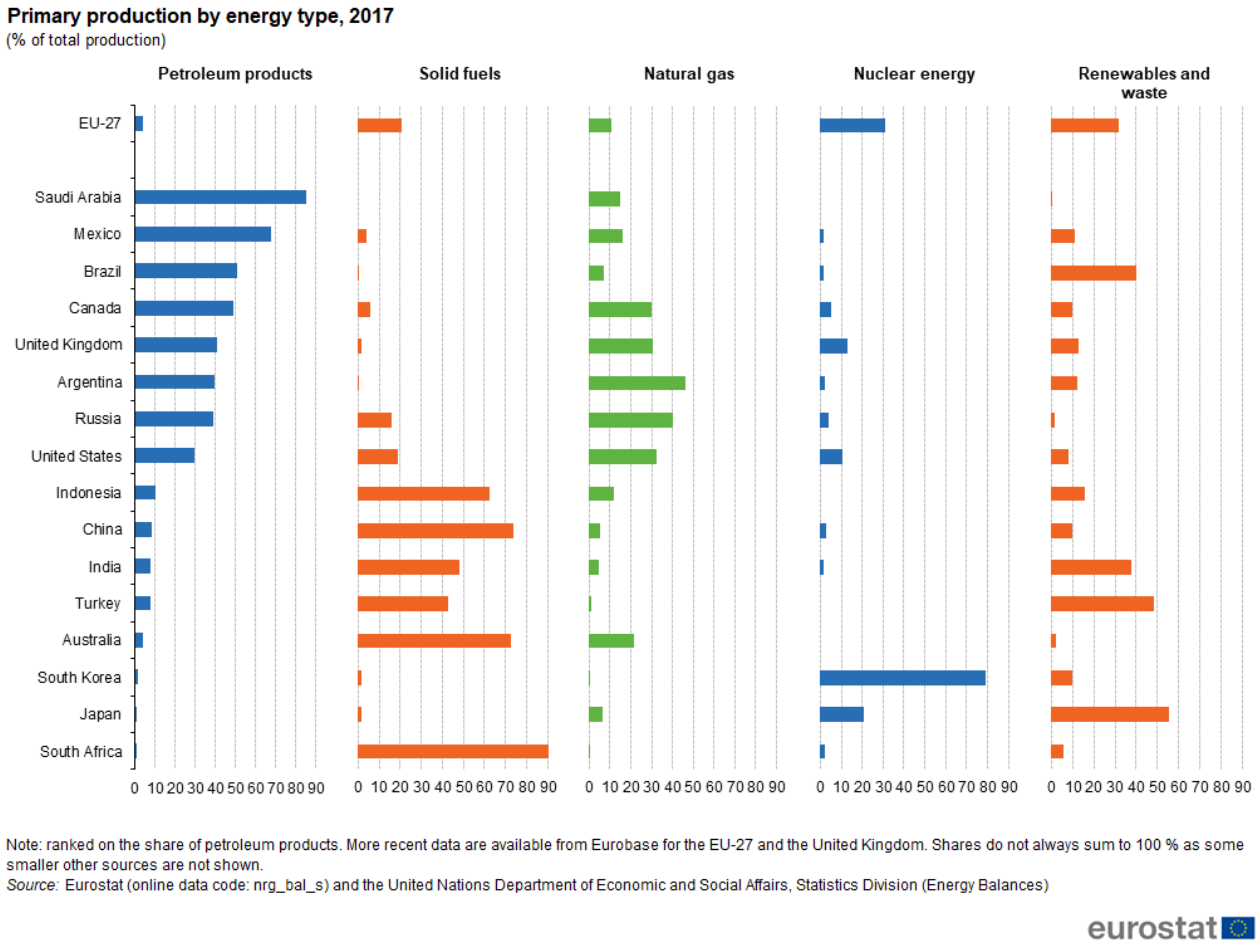


Figure 1: Primary production by energy type, 2017 (% of total production) Source: Eurostat (nrg_bal_s) and the United Nations Department of Economic and Social Affairs, Statistics Division (Energy Balances)

Trade in energy products

The main difference between levels of primary energy production and total energy supply is international trade: a shortfall of production needs to be met by net imports (the balance of imports minus exports) and a production surplus is generally accompanied by net exports.

Among the G20 members, the largest net exporters of energy in 2017 were Russia and Saudi Arabia, while net exports from Australia, Indonesia and Canada were also substantial (see Figure 2); South Africa also recorded a small trade surplus for energy products. The largest net importer of energy among the G20 members was the EU-27, followed by China, Japan, India, South Korea and the United States.

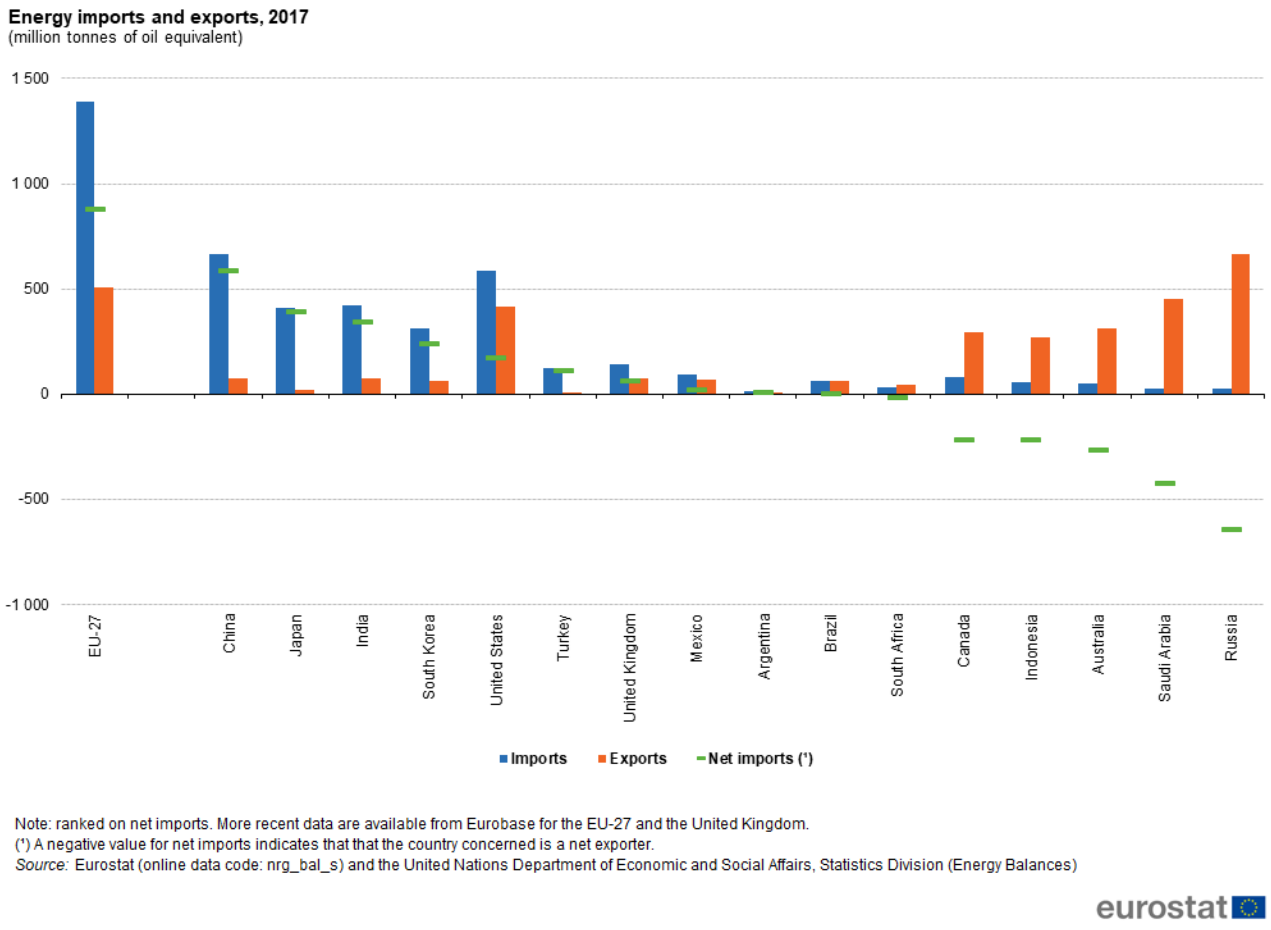


Figure 2: Energy imports and exports, 2017 (million tonnes of oil equivalent) Source: Eurostat (nrg_bal_s) and the United Nations Department of Economic and Social Affairs, Statistics Division (Energy Balances)

Petroleum products dominated energy imports in 2017

A study of the composition of gross energy imports (see Figure 3) shows that petroleum products (including crude oil) tended to dominate energy imports in the majority of G20 members. These products accounted for close to or more than half of all energy imports in each of the G20 members except for Turkey, Argentina and Russia; gas formed a large part of Argentina's and Turkey's energy imports, while in Russia more than half of all energy imports were solid fuels.

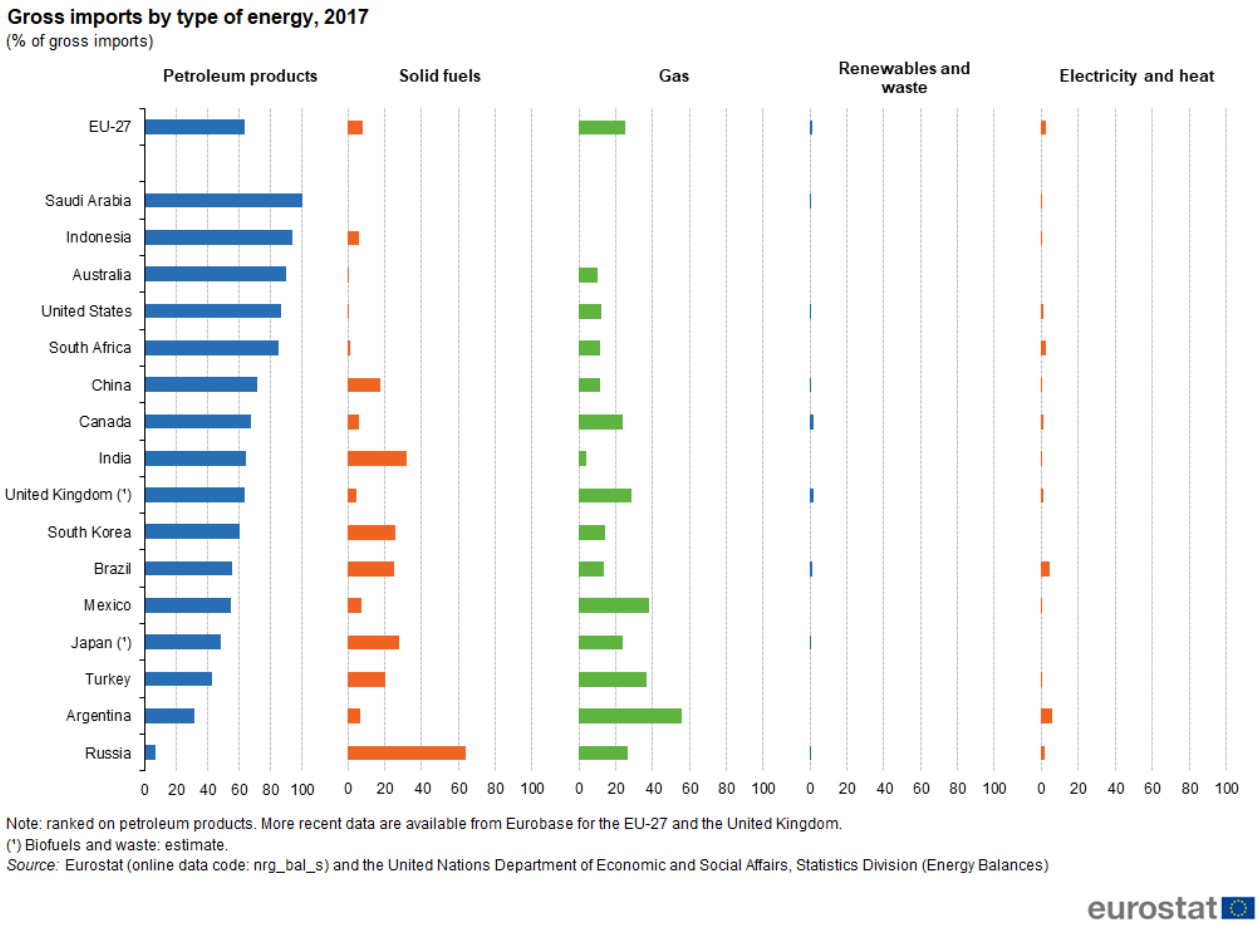
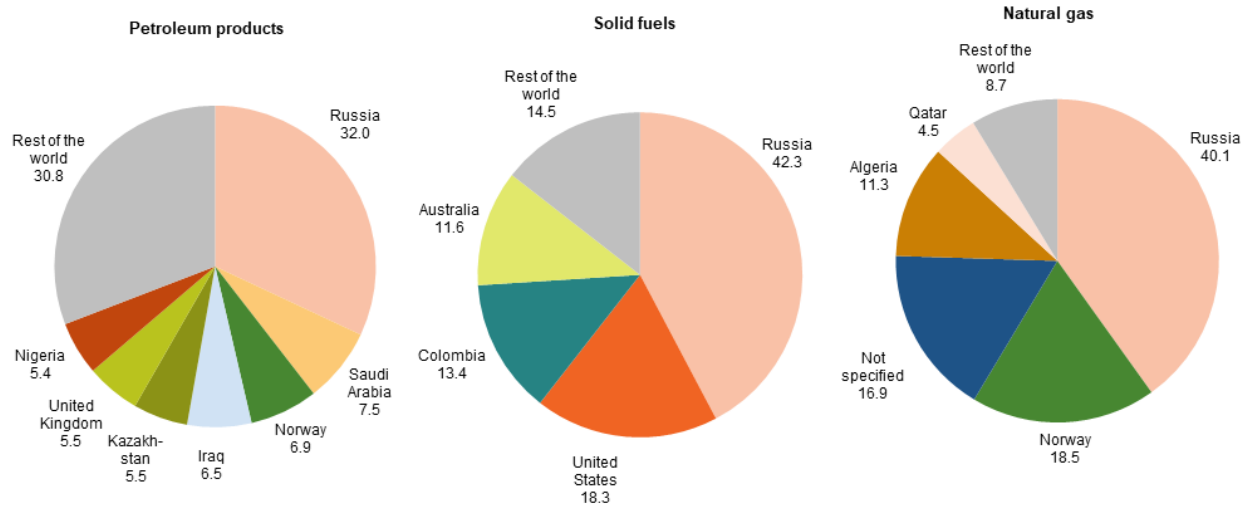


Figure 3: Gross imports by type of energy, 2017 (% of gross imports) Source: Eurostat (nrg_bal_s) and the United Nations Department of Economic and Social Affairs, Statistics Division (Energy Balances)

Russia was the largest supplier of fossil fuels to the EU-27 in 2018

As noted above, the EU-27 was dependent on imports to meet its needs for energy. Figure 4 identifies the main countries of origin for the EU-27's gross imports of fossil fuels from non-member countries. Russia was the single largest supplier of EU-27 imports for all three fossil fuel categories in 2018, providing 32 % of petroleum products, 42 % of solid fuels, and 40 % of natural gas. Saudi Arabia was the second largest supplier of petroleum products, while Norway was the third largest supplier of these products as well as the second largest supplier of natural gas. Imports of solid fuels and of natural gas into the EU-27 were particularly concentrated among the largest suppliers. For example, the top four providers of solid fuels together supplied 86 % of the EU-27's imports from all non-EU countries. By contrast, despite the large share of imports from Russia, the supply of petroleum products was less concentrated, as the top seven providers together supplied 69 % of the EU-27's imports from non-EU countries.

Main origins of extra-EU imports, EU-27, 2018
(%)



Source: Eurostat (online data codes: nrg_ti_sff, nrg_ti_oil and nrg_ti_gas)

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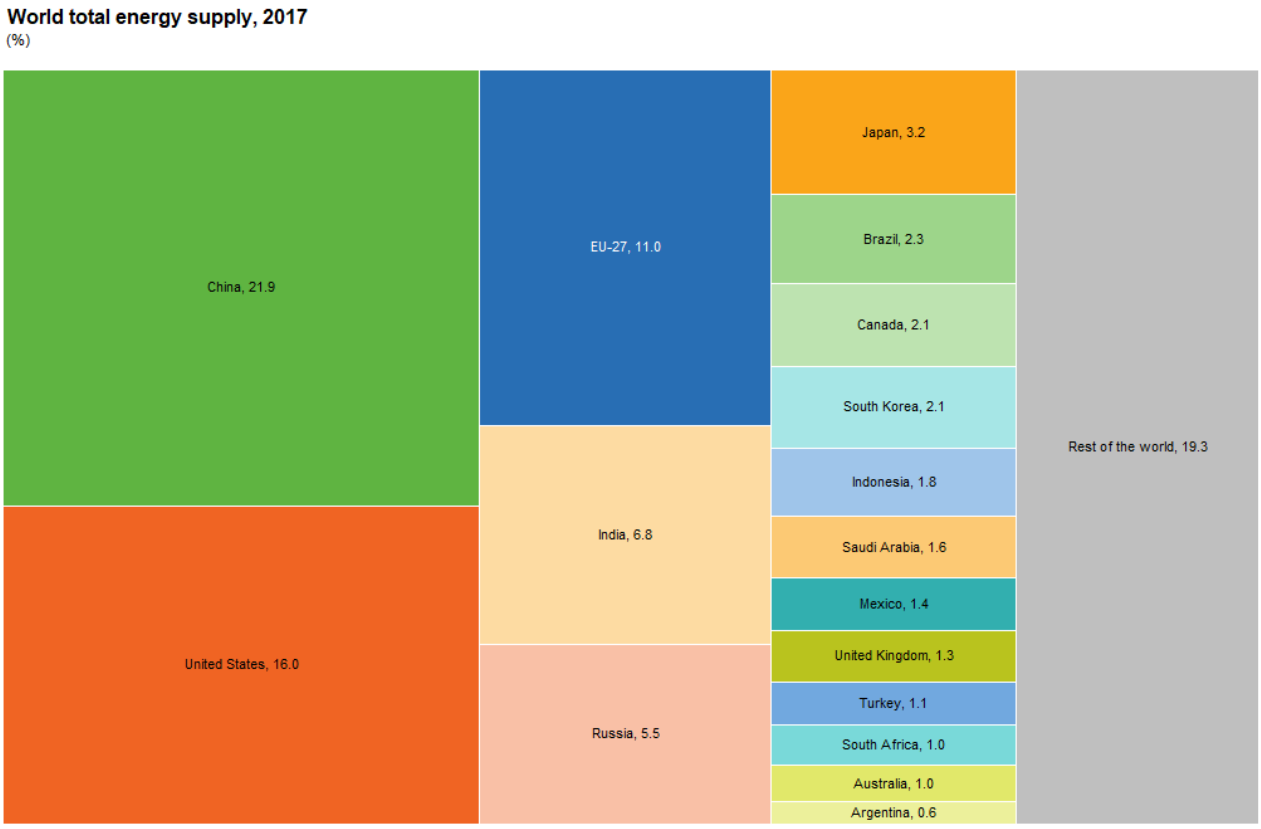
Figure 4: Main origins of extra-EU imports, EU-27, 2018 (%) Source: Eurostat (nrg_ti_sff), (nrg_ti_oil) and (nrg_ti_gas)

Total energy supply

Total energy supply is the total energy demand of a country or region; it represents the quantity of energy necessary to satisfy inland consumption of the geographical entity under consideration. This covers consumption by the energy sector itself, distribution and transformation losses, and final energy consumption by end users.

Global total energy supply was 13.2 billion toe in 2017, of which the G20 members accounted for around four fifths (81 %), significantly higher than their collective share of primary production. China consumed one fifth (22 %) of the world energy total in 2017 (see Map 2), more than any other G20 member, followed by the United States (16 %) and the EU-27 (11 %); these three members together consumed nearly half (49 %) of all energy worldwide.



Map 2: World total energy supply, 2017 (%) Source: Eurostat (nrg_bal_s) and the United Nations Department of Economic and Social Affairs, Statistics Division (Energy Statistics Yearbook and Energy Balances)

Brazil, Indonesia and India recorded high shares for biofuels and waste in energy supply in 2017

In 2017, total energy supply was entirely made up of fossil fuels in Saudi Arabia: 54.9 % from petroleum products and 45.1 % from gas (see Figure 5). Petroleum products, solid fuels and gas provided more than 90 % of total energy supply in Australia, South Africa and Japan, and between 80 % and 90 % in China, Russia, Mexico, Argentina, Turkey, South Korea and the United States. In the EU-27, the share of these sources was 71 %; the only G20 members to record lower shares were Indonesia (70 %) and Brazil (57 %).

The EU-27 and South Korea had the highest shares of nuclear energy in total energy supply, both 13.6 %. South Korea's share of nuclear energy in total energy supply was considerably lower than the equivalent share for primary production, indicating South Korea's high dependency on imported fossil fuels, notably petroleum products and solid fuels. The next highest shares of nuclear energy in total energy supply were observed in the United Kingdom, the United States, Canada and Russia.

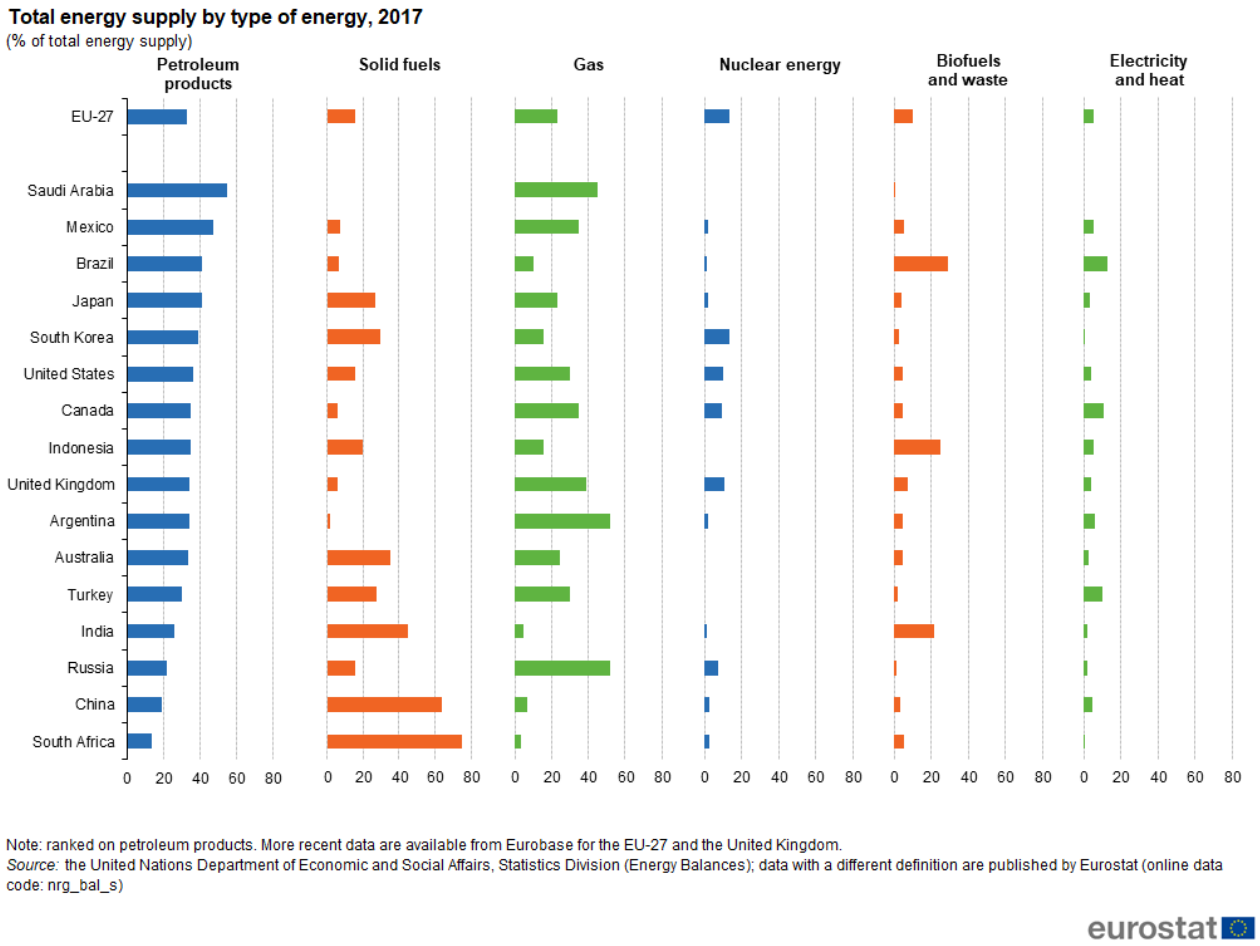
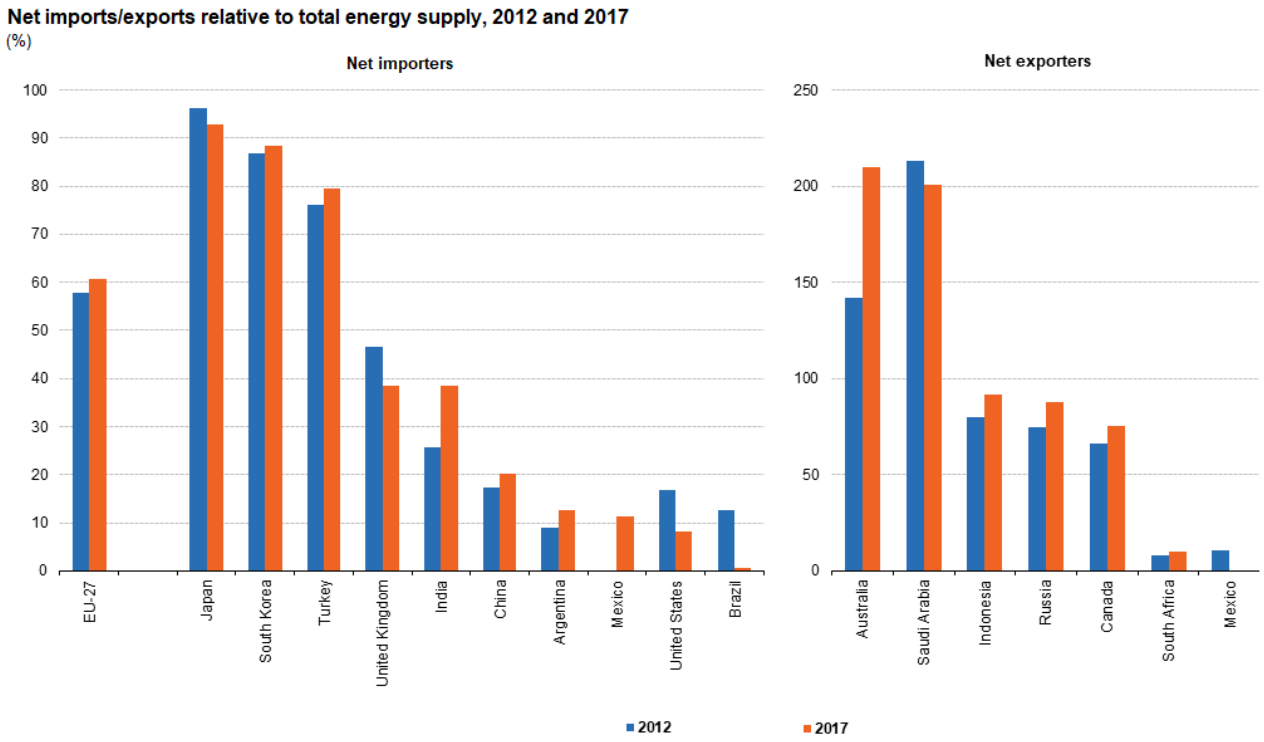


Figure 5: Total energy supply by type of energy, 2017 (% of total energy supply) Source: the United Nations Department of Economic and Social Affairs, Statistics Division (Energy Balances)

As for primary production, Brazil, Indonesia and India recorded high shares for biofuels and waste in total energy supply, all over 20 %. By contrast, Russia and Saudi Arabia recorded the lowest shares for biofuels and waste in total energy supply.

In Japan, South Korea, Turkey and the EU-27 more than half of all energy needs were met by imports in 2017

Figure 6 reveals the extent to which total energy supply was met by net imports as opposed to primary production for countries that were net importers, in other words the energy dependency . For net exporters it shows the size of their net exports relative to their own needs (the total energy supply). Among the G20 members, Japan, South Korea, Turkey and the EU-27 all recorded net imports that covered more than half of their total energy supply. Energy dependency ratios of 20 % or lower were recorded in 2017 for China, Argentina, Mexico, the United States and Brazil. By contrast, Australia's and Saudi Arabia's net exports were around twice as high as their total energy supply.



Note: different scales used for the two parts of the figure; Mexico is shown in both parts of the figure a it was a net exporter in 2012 and a net importer in 2017. More recent data are available from Eurobase for the EU-27 and the United Kingdom.
Source: Eurostat (online data code: nrg_bal_s) and the United Nations Department of Economic and Social Affairs, Statistics Division (Energy Balances)

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Figure 6: Net imports/exports relative to total energy supply, 2012 and 2017 (%) Source: Eurostat (nrg_bal_s) and the United Nations Department of Economic and Social Affairs, Statistics Division (Energy Balances)

Between 2012 and 2017, Mexico moved from being a net exporter to being a net importer of energy, despite a contraction in its total energy supply. During the same period, the dependence on imports increased in India, Argentina, Turkey, China, the EU-27 and South Korea, as their net imports grew more rapidly than their energy supply (in the EU-27, total energy supply actually fell slightly during the period under consideration). The dependency on imports reduced between 2012 and 2017 in Brazil, the United States, the United Kingdom and Japan: net imports fell in all of these countries, while total energy supply fell less strongly in Japan and the United Kingdom and continued to expand in Brazil and the United States.

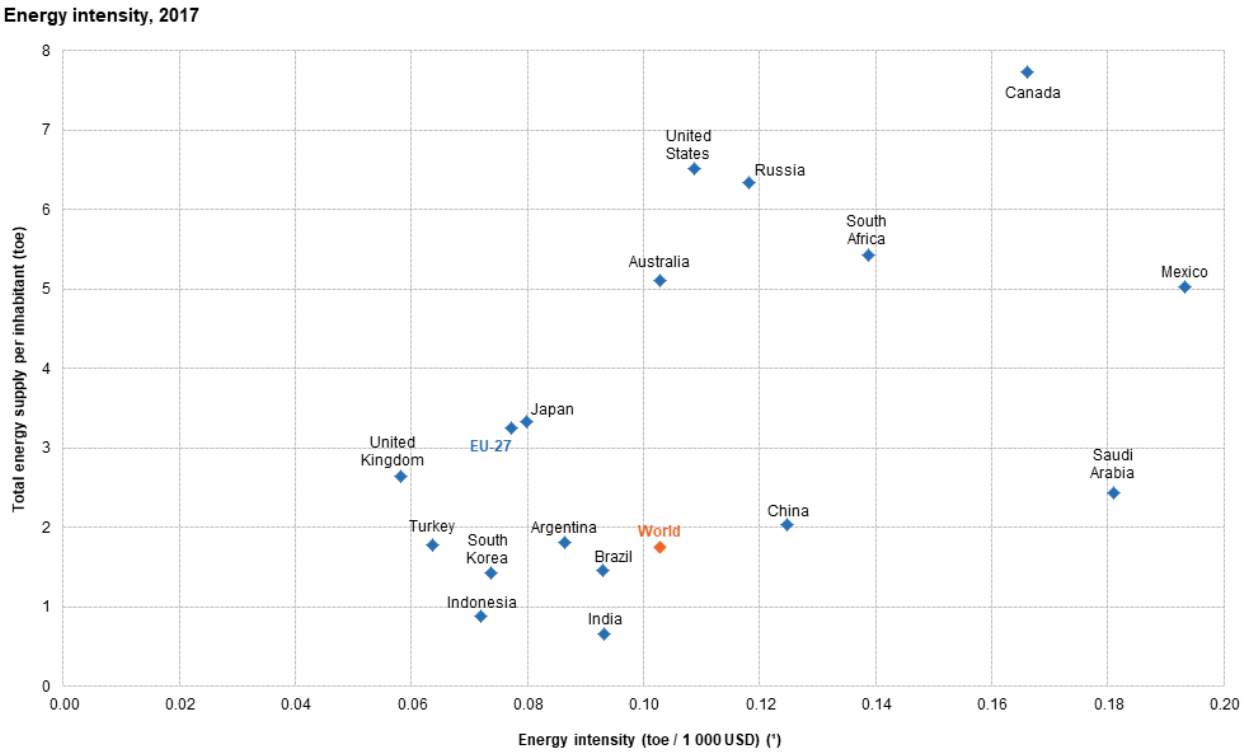
Relative to its total energy supply, net exports decreased between 2012 and 2017 in Saudi Arabia, as total energy supply increased faster than net exports. The reverse situation was observed in Canada, as net exports increased faster than total energy supply. In the four other G20 members that were net exporters in 2012 and 2017 — Australia, Indonesia, Russia and South Africa — net exports increased while total energy supply contracted.

Energy intensity

Energy intensity is an indicator of an economy's energy efficiency and relates the quantity of energy consumed to the level of economic output, the latter represented by gross domestic product (GDP) . To facilitate spatial comparisons, GDP is calculated in a common currency (United States dollars are used in Figure 7) using purchasing power parities (PPPs) rather than market exchange rates: PPPs are indicators of price level differences across countries.

Mexico, Saudi Arabia and Canada had the most energy intense economies in 2017 among the G20 members, followed by South Africa. By contrast, the United Kingdom, Turkey, Indonesia, South Korea, the EU-27 and Japan had the lowest levels of energy intensity. It should be noted that the economic structure of an economy plays an important role in determining energy intensity, as post-industrial economies with large service sectors tend to have considerably lower energy use than economies characterised by heavy, traditional, industrial activities.

Figure 7 also shows the level of total energy supply per inhabitant. Six of the G20 members recorded notably higher levels of energy supply per inhabitant than the others, averaging 5.0-7.7 toe per inhabitant in Canada, the United States, Russia, South Africa, Australia and Mexico, whereas energy supply per inhabitant was at most 3.3 toe per inhabitant elsewhere. The lowest levels of energy supply per inhabitant were in Indonesia and India, both below 1.0 toe per inhabitant.

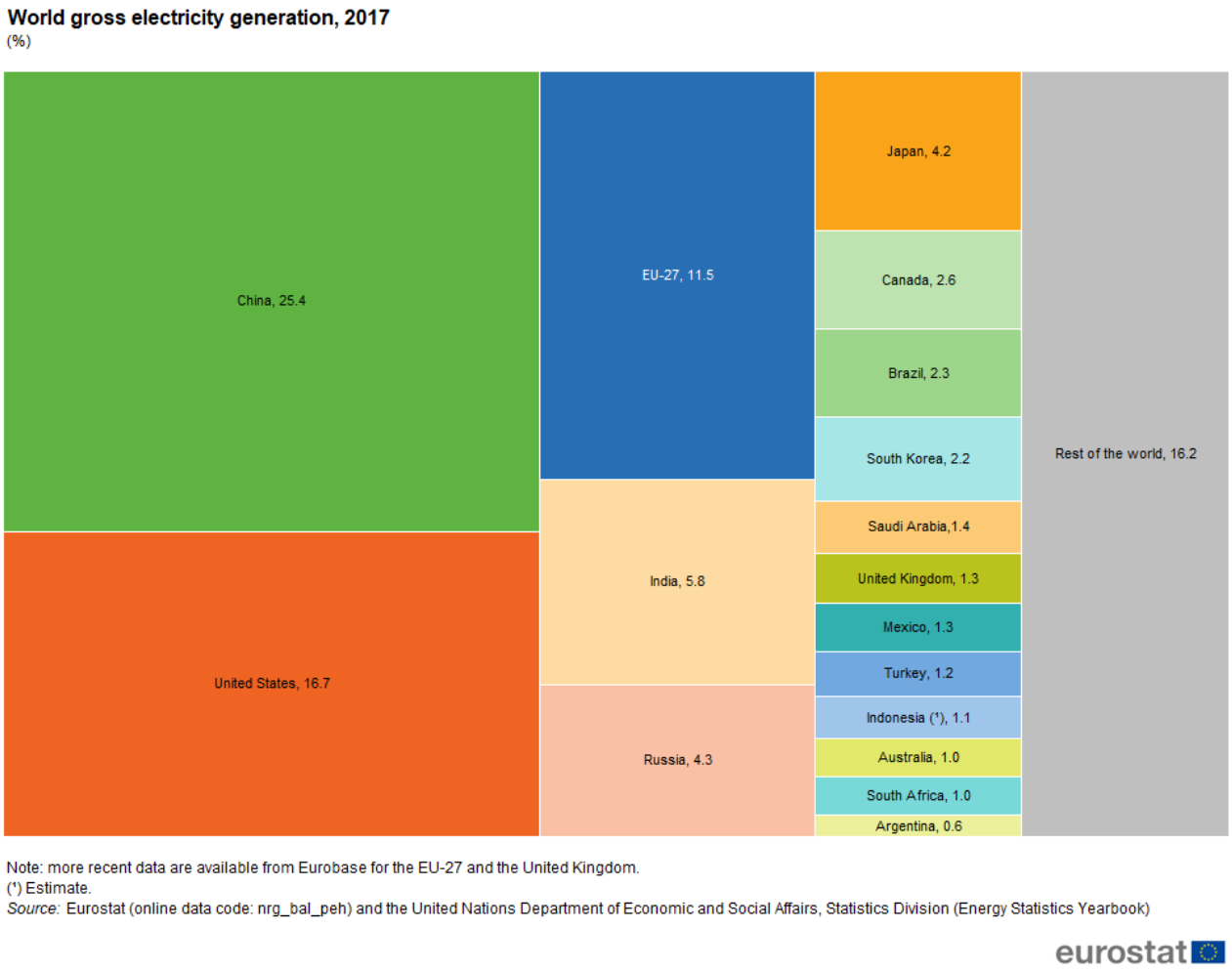


Note: more recent data are available from Eurobase for the EU-27 and the United Kingdom.
(*) Energy intensity is the ratio between total energy supply and gross domestic product (GDP). The GDP figures are expressed in United States dollars (USD) converted using purchasing power parities.
Source: Eurostat (online data codes: nrg_bal_s and demo_gind), the United Nations Department of Economic and Social Affairs, Statistics Division (Energy Statistics Yearbook and Energy Balances), the World Bank (World Development Indicators) and the United Nations Department of Economic and Social Affairs, Population Division (World Population Prospects 2019)

Figure 7: Energy intensity, 2017 Source: Eurostat (nrg_bal_s) and (demo_gind), the United Nations Department of Economic and Social Affairs, Statistics Division (Energy Statistics Yearbook and Energy Balances), the World Bank (World Development Indicators) and the United Nations Department of Economic and Social Affairs, Population Division (World Population Prospects 2019)

Electricity generation

Gross electricity generation (also known as gross electricity production), is the total amount of electrical energy produced by transforming other forms of energy, for example nuclear or wind power. Total gross electricity generation worldwide was 25.6 million gigawatt hours (GWh) in 2017, of which 84 % was generated by G20 members (see Map 3). China, the United States and the EU-27 accounted for the highest shares of electricity generation among G20 members, generating 25 %, 17 % and 12 % of the world total respectively.



Map 3: World gross electricity generation, 2017 (%) Source: Eurostat (nrg_bal_peh) and the United Nations Department of Economic and Social Affairs, Statistics Division (Energy Statistics Yearbook)

Nuclear power contributed 26.2 % of the electricity generated in 2017 in South Korea and 25.7 % of the total in the EU-27

Combustible fuel power stations generated two thirds (66.7 %) of electricity worldwide in 2017, a share that was surpassed in all but six of the G20 members: the United States, Russia, the United Kingdom, the EU-27, Brazil and Canada. Saudi Arabia generated practically all of its electricity from combustible fuels, with the share close to nine tenths in South Africa (89.0 %) and Indonesia (88.8 %).

Hydro-electric power supplied 16.3 % of the world's electricity in 2017. Notably higher shares were recorded in Brazil (62.9 %), Canada (59.6 %) and Argentina (28.6 %), while shares above the world average were also recorded in Turkey, China and Russia; in the EU-27 the share of electricity generated from hydropower was 10.9 %— see Figure 8.

Nuclear power contributed some 25.7 % of the electricity generated in the EU-27 in 2017, which was more than double the world average (10.3 %) and the second highest share among G20 members, behind South Korea (26.2 %).

Figure 8 presents data for two other types of renewable energy, namely wind and solar. The G20 members with the highest proportion of gross electricity generation from wind were the United Kingdom (14.8 %) and the EU-27 (10.6 %), where the contribution of this source was more than double the world average (4.4 %). Solar power provided 5.2 % of the electricity generated in Japan, while relatively high shares were also recorded in the EU-27 (3.7 %), the United Kingdom (3.4 %) and Australia (3.1 %), compared with a world average of 1.6 %.

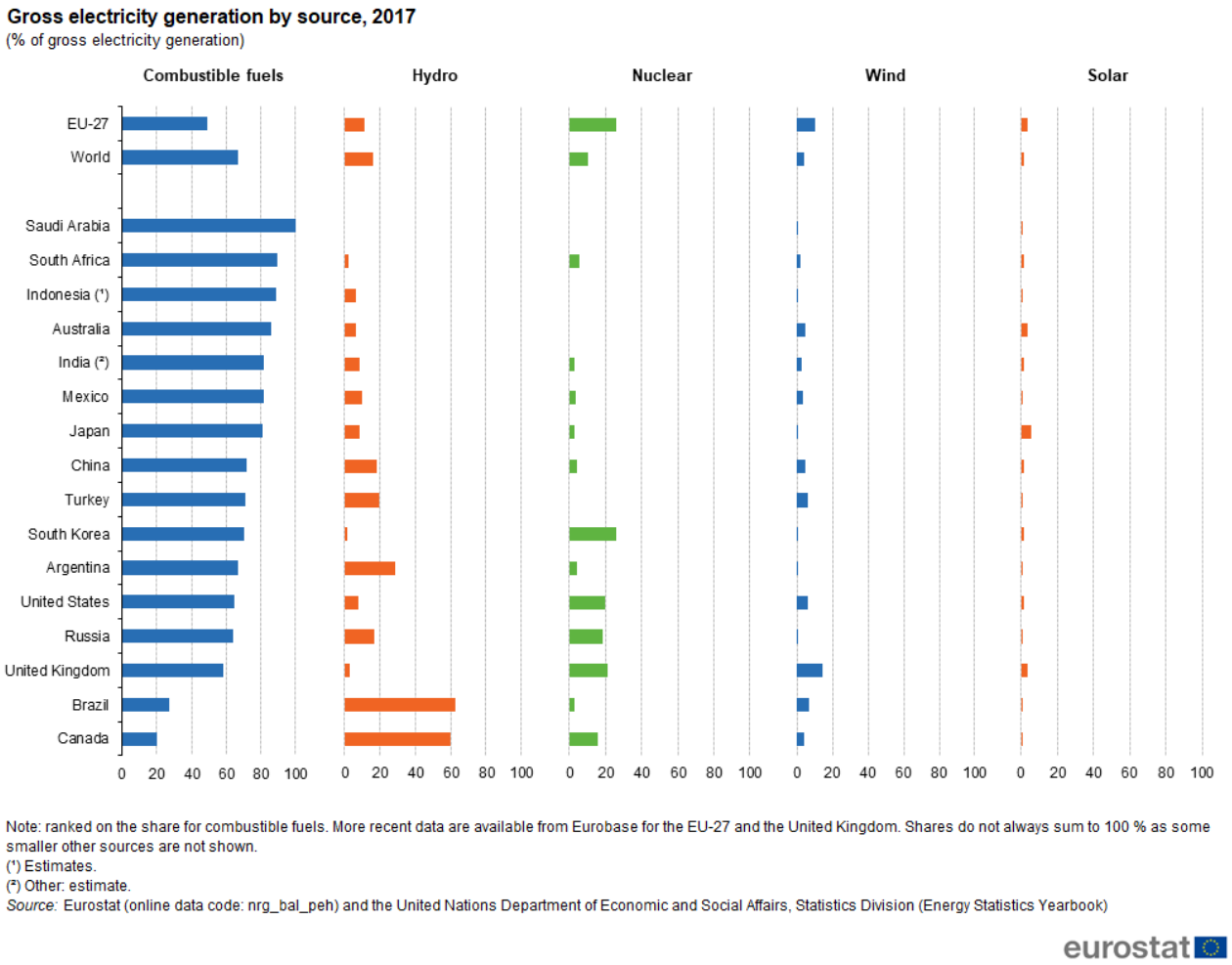
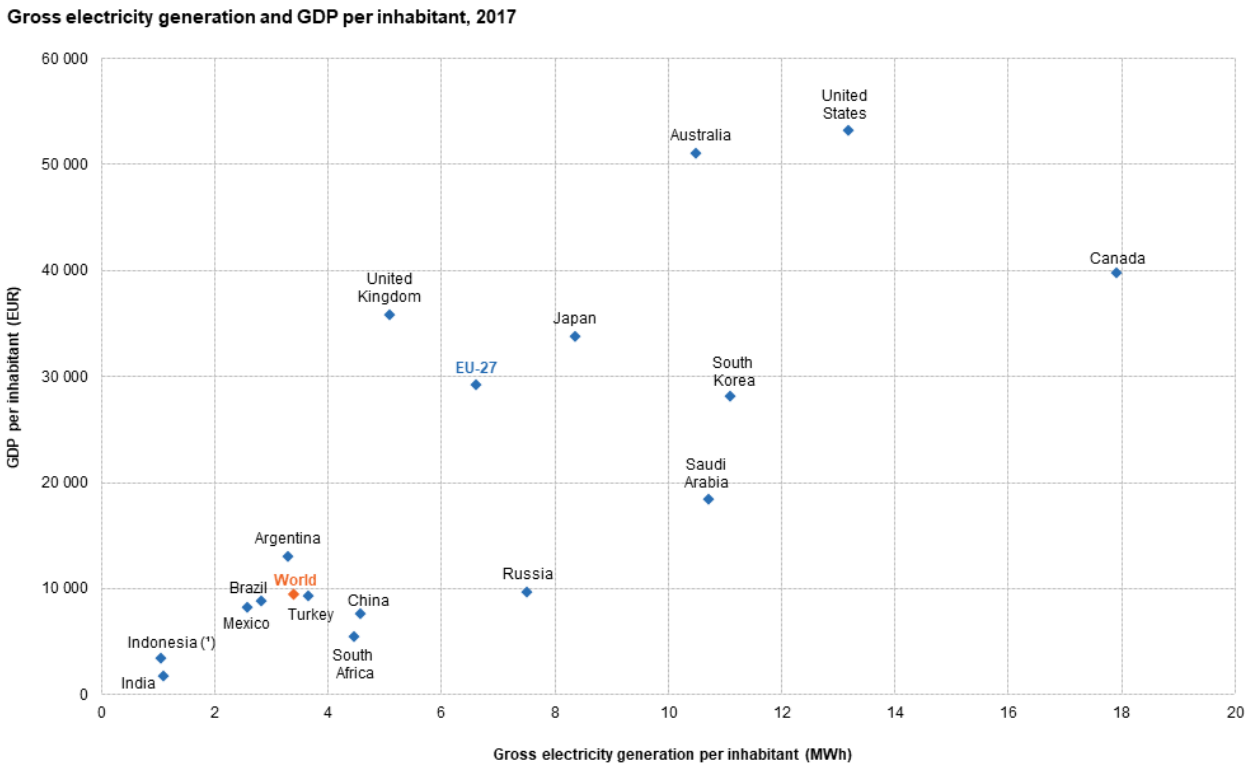


Figure 8: Gross electricity generation by source, 2017 (% of gross electricity generation) Source: Eurostat (nrg_bal_peh) and the United Nations Department of Economic and Social Affairs, Statistics Division (Energy Statistics Yearbook)

Canada had by far the highest level of electricity generation per inhabitant in 2017 among the G20 members

Relative to population size, Canada had by far the highest electricity generation among the G20 members, 17.9 MWh per inhabitant in 2017, around five times as high as the world average (see Figure 9). The EU-27 ranked in the middle of the G20 members, with 6.6 MWh of electricity generated per inhabitant in 2017, a little less than double the world average. Argentina, Brazil, Mexico, India and Indonesia were the only G20 members with ratios of electricity generation to population size that were below the world average.

The United Kingdom, Australia, the EU-27, the United States, Japan and Argentina recorded relatively high GDP per inhabitant in contrast to their levels of electricity generation per inhabitant, while the reverse was true in Saudi Arabia, China, India, Russia and South Africa.



Note: more recent data are available from Eurobase for the EU-27 and the United Kingdom.
(*) Estimates.
Source: Eurostat (online data codes: nrg_bal_peh, demo_gind and nama_10_pc), the United Nations Department of Economic and Social Affairs, Statistics Division (Energy Statistics Yearbook), and the United Nations Department of Economic and Social Affairs, Population Division (World Population Prospects 2019) and Statistics Division (Analysis of Main Aggregates)

eurostat

Figure 9: Gross electricity generation and GDP per inhabitant, 2017 Source: Eurostat (nrg_bal_peh), (demo_gind) and (nama_10_pc), the United Nations Department of Economic and Social Affairs, Statistics Division (Energy Statistics Yearbook), and the United Nations Department of Economic and Social Affairs, Population Division (World Population Prospects 2019) and Statistics Division (Analysis of Main Aggregates)

Source data for tables and graphs

- Energy: tables and figures

Data sources

The statistical data in this article were extracted during March 2020.

The indicators are often compiled according to international — sometimes worldwide — standards. Although most data are based on international concepts and definitions there may be certain discrepancies in the methods used to compile the data.

EU data

Nearly all of the indicators presented for the EU and the United Kingdom have been drawn from Eurobase, Eurostat's online database. Eurobase is updated regularly, so there may be differences between data appearing in this article and data that is subsequently downloaded. Some of the data have been extracted from international sources for reasons of comparability or availability.

G20 members from the rest of the world

For the non-EU G20 members other than the United Kingdom, the energy statistics presented have been compiled

by the United Nations Department of Economic and Social Affairs as have population data. GDP data from the World Bank and from the International Monetary Fund's (IMF) have also been used.

Context

A competitive, reliable and sustainable energy sector is considered essential for all advanced economies. The energy sector has been under the spotlight due to a number of issues that have pushed energy up the political agenda, including the volatility of prices, interruptions to energy supplies, and increased attention to anthropogenic (human-induced) effects of energy use on climate change , in particular, increased levels of greenhouse gas emissions.

Other articles

- All articles on energy
- All articles on the non-EU countries
- Other articles from *The EU in the world*

Publications

- The EU in the world 2020
- Statistics on European Neighbourhood Policy countries: South — 2020 edition
- The European Union and the African Union — A statistical portrait — 2019 edition ;
- Key figures on the enlargement countries — 2019 edition
- Smarter, greener, more inclusive? Indicators to support the Europe 2020 strategy — 2019 edition
- Energy, transport and environment indicators — 2019 edition
- Sustainable Development in the European Union — Monitoring report on progress towards the SDGs in an EU context
- Statistics on European Neighbourhood Policy countries: East — 2018 edition
- Globalisation patterns in EU trade and investment
- 40 years of EU-ASEAN cooperation — 2017 edition
- Asia-Europe Meeting (ASEM) — A statistical portrait — 2016 edition
- The European Union and the BRIC countries
- The European Union and the Republic of Korea — 2012

Database

- Energy (nrg) , see:

Energy statistics - quantities (nrg_quant)

Energy statistics - quantities, annual data (nrg_quanta)

Energy balances (nrg_bal)

Simplified energy balances (nrg_bal_s)

Production of electricity and derived heat by type of fuel (nrg_bal_peh)

Trade by partner country (nrg_t)

Imports (nrg_ti)

Imports of solid fossil fuels by partner country (nrg_ti_sff)

Imports of oil and petroleum products by partner country (nrg_ti_oil)

Imports of natural gas by partner country (nrg_ti_gas)

- Demography and migration (demo) , see:

Population change - Demographic balance and crude rates at national level (demo_gind)]

- Annual national accounts (nama_10) , see:

Auxiliary indicators (population, GDP per capita and productivity) (nama_10_aux)

Main GDP aggregates per capita (nama_10_pc)

Dedicated section

- Energy

Visualisations

- Shedding light on energy in the EU

External links

United Nations Department of Economic and Social Affairs

- World Population Prospects

United Nations Statistics Division

- Energy statistics
  - National Accounts — Analysis of Main Aggregates

The World Bank

- DataBank