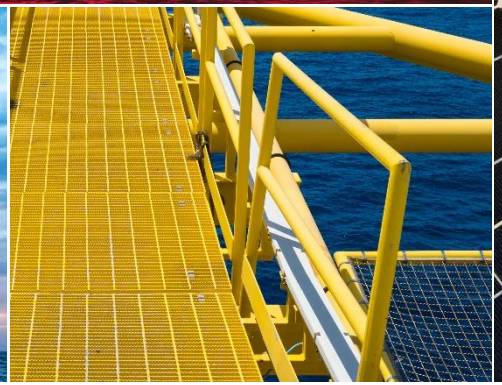


Our Energy World in Data

JUNE 2020

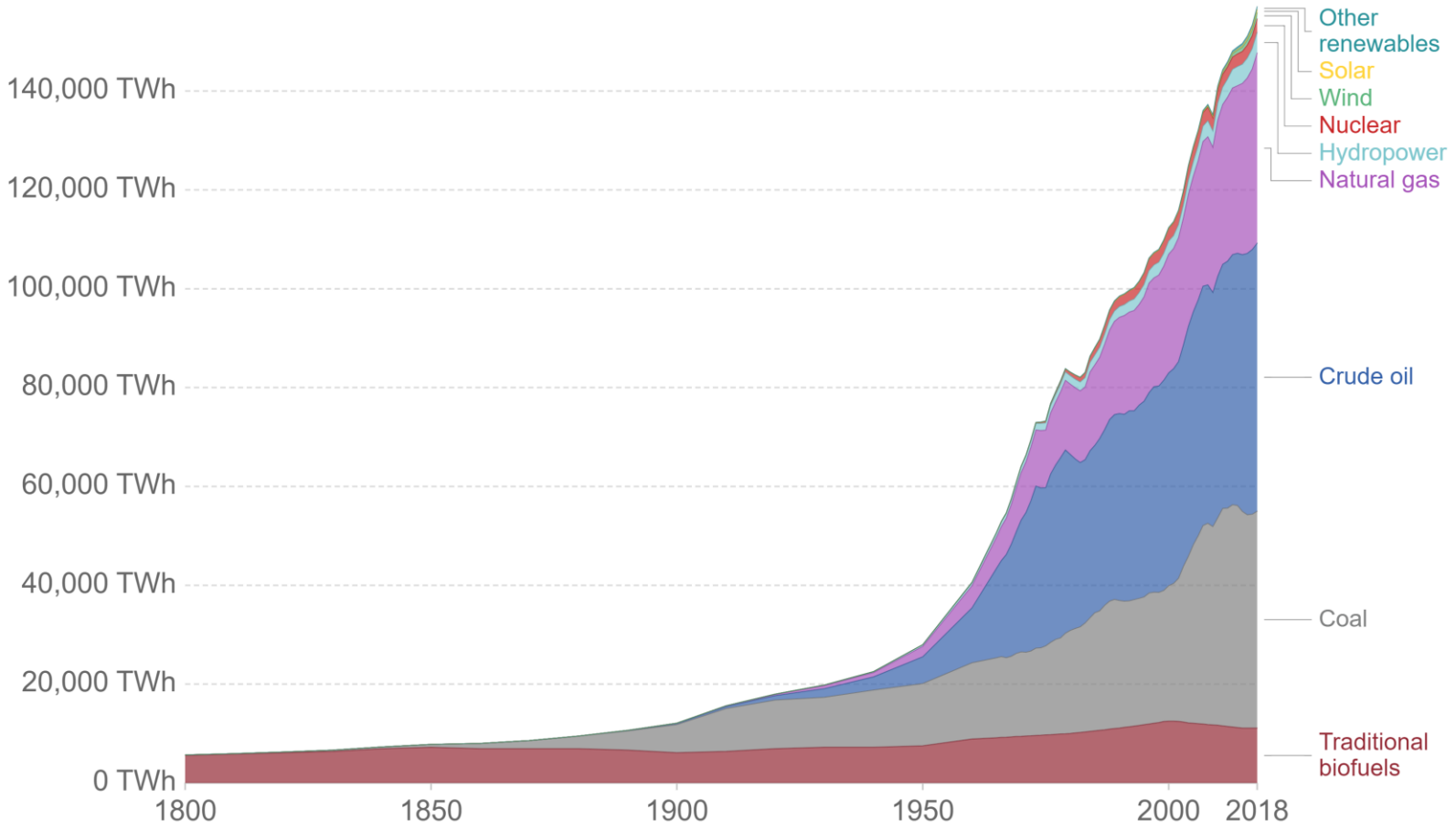
Energy Consumption

Updated June 2020

Global primary energy consumption

Global primary energy consumption, measured in terawatt-hours (TWh) per year. Here 'other renewables' are renewable technologies not including solar, wind, hydropower and traditional biofuels.

Our World in Data

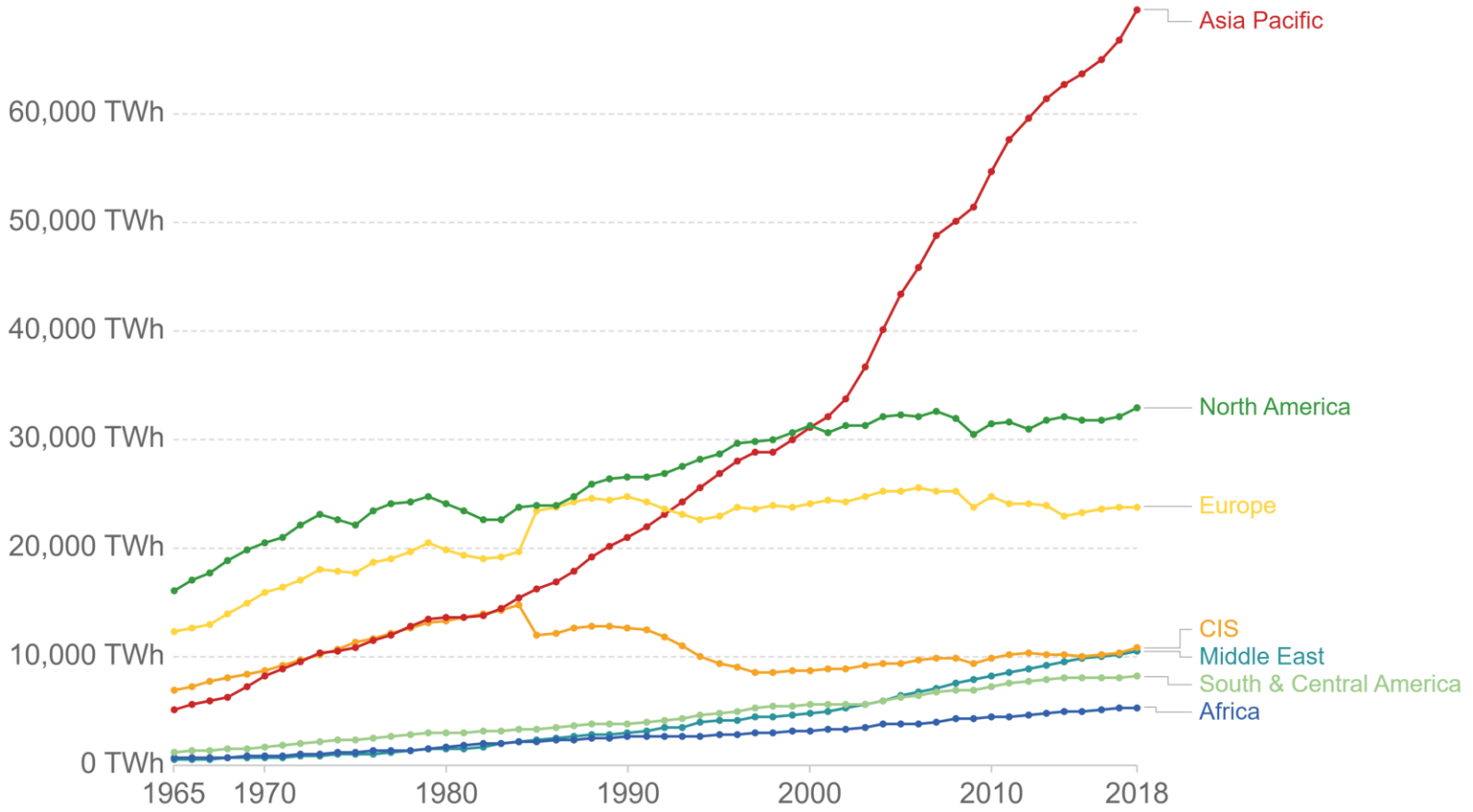


Source: Vaclav Smil (2017) and BP Statistical Review of World Energy

CC BY

Primary energy consumption by world region, 1965 to 2018

Primary energy consumption is measured in terawatt-hours (TWh). Note that this data includes only commercially-traded fuels (coal, oil, gas), nuclear and modern renewables used in electricity production. As such, it does not include traditional biomass sources.



Source: BP Statistical Review of World Energy (2019)

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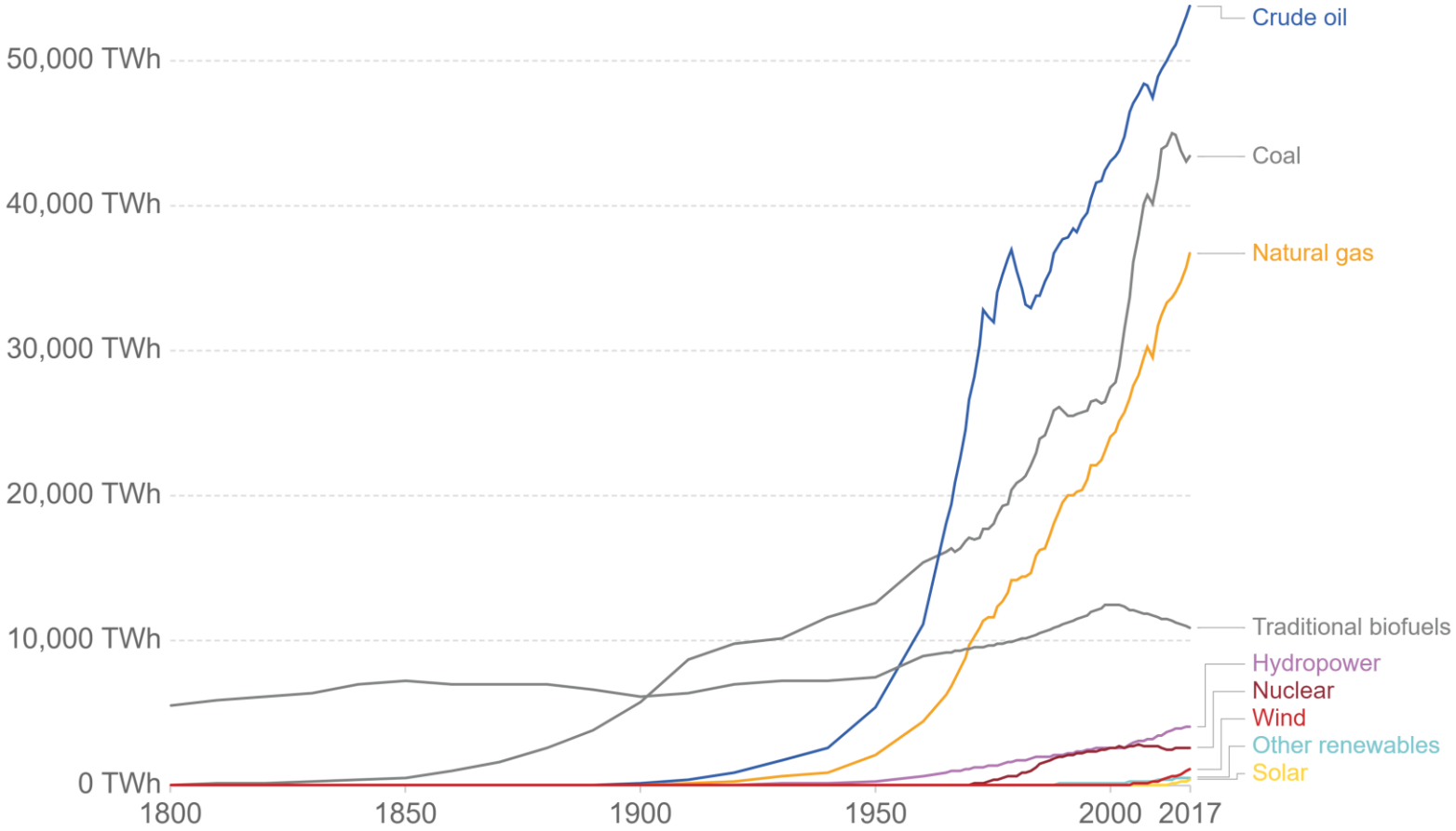
Global primary energy consumption by source

Global primary energy consumption, measured in terrawatt-hours (TWh) per year. Here 'other renewables' are renewable technologies not including solar, wind, hydropower and traditional biofuels.

Our World in Data



Source: Vaclav Smil (2017) & BP Statistical Review of World Energy

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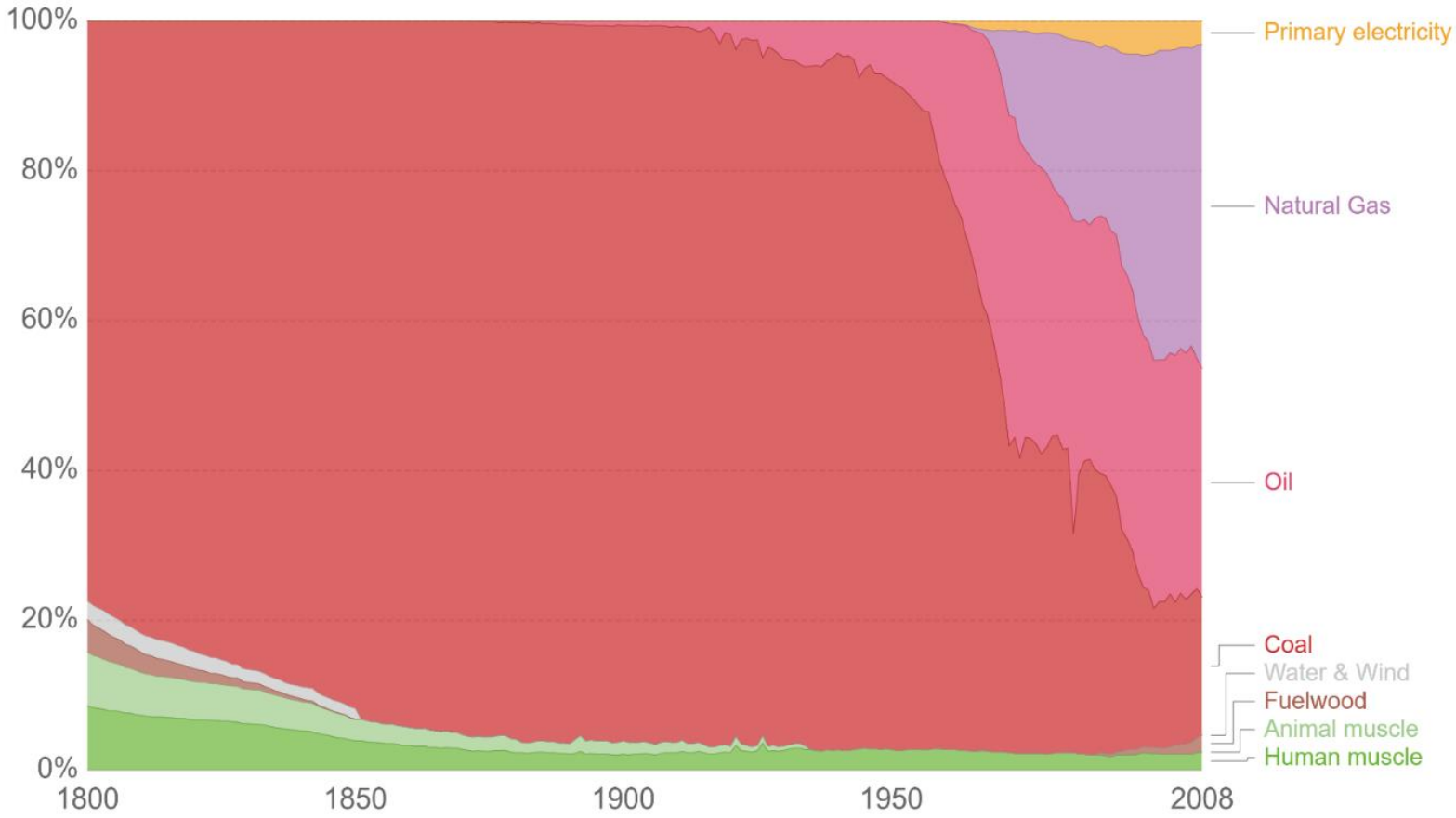
Long-term energy transitions, England & Wales

Share of primary energy by source over the long-term, measured as the percentage of total energy consumption. Primary electricity includes: hydropower, nuclear power, wind, photovoltaics, tidal, wave and solar thermal and geothermal (only figures for electricity production are included).

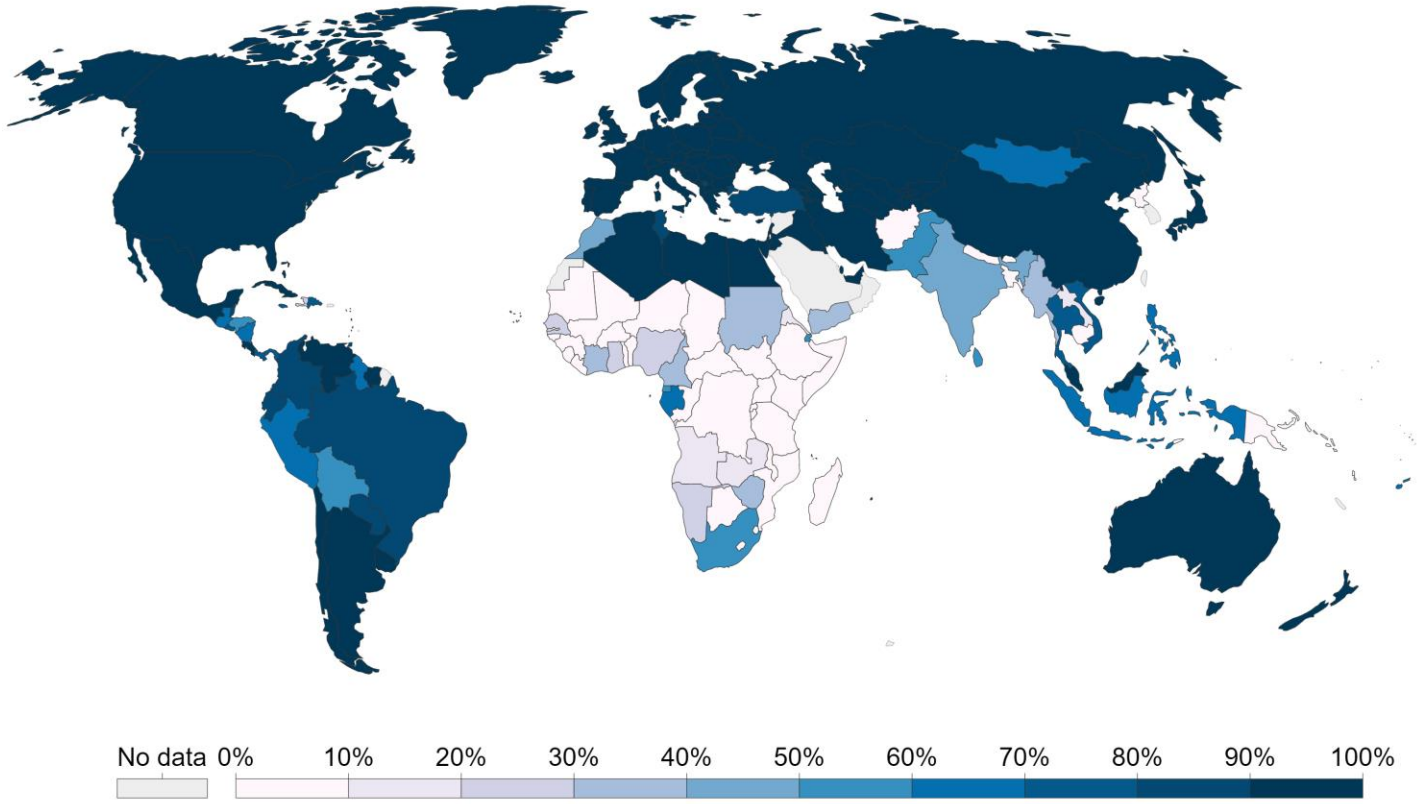


Source: Joint Center for History and Economics, Harvard University and University of Cambridge. Energy History.
OurWorldInData.org/energy-production-and-changing-energy-sources/ • CC BY-SA

Share of the population with access to electricity, 1990

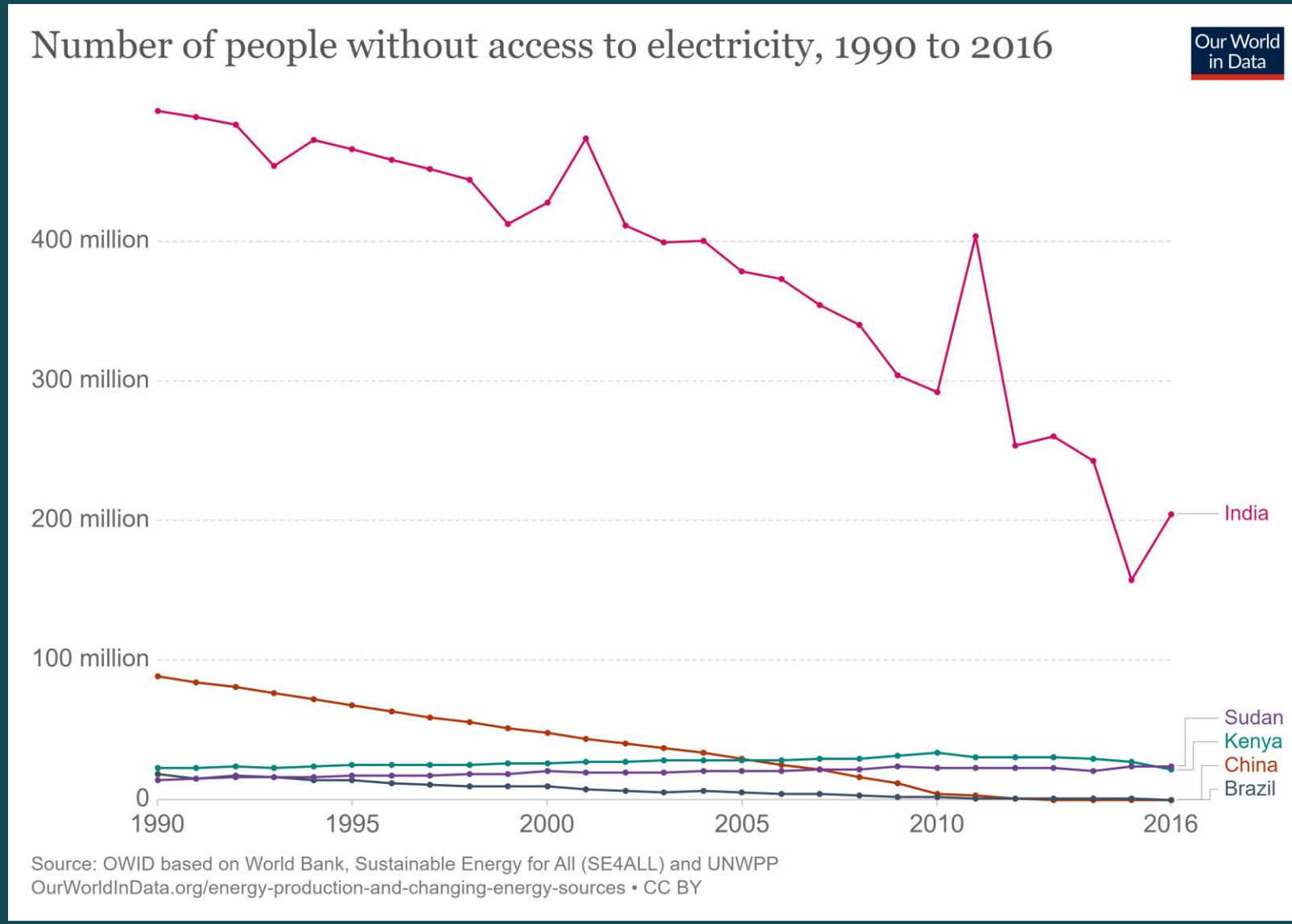
Our World in Data

Data represents electricity access at the household level, that is, people who have electricity in their home. It comprises electricity sold commercially, both on-grid and off-grid. Countries considered as “developed” by the UN, and classified as high income are assumed to have an electrification rate of 100% from the first year the country entered the category.



Source: The World Bank

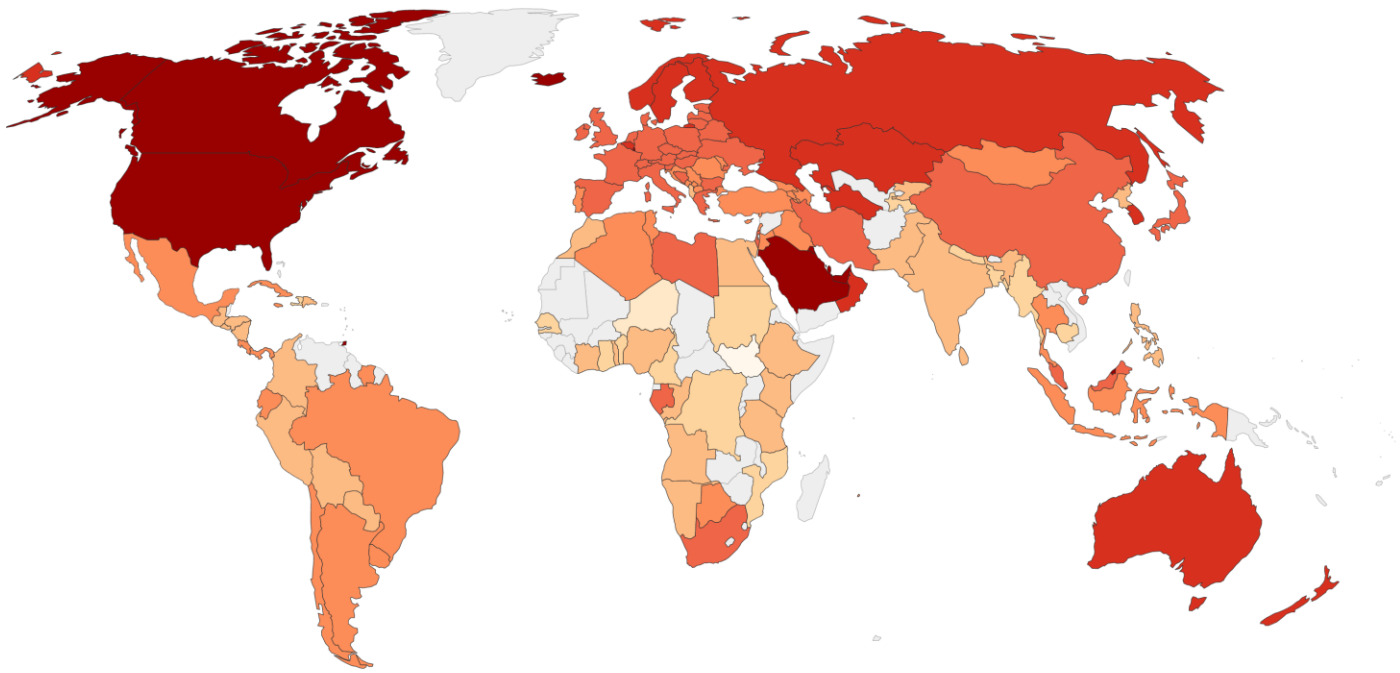
OurWorldInData.org/energy-production-and-changing-energy-sources/ • CC BY

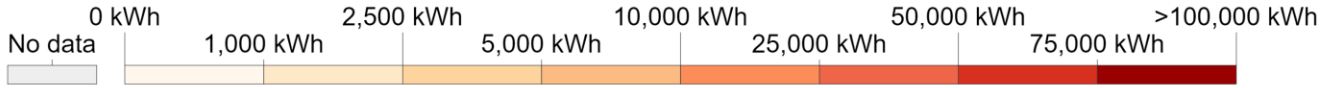

Number of people without access to electricity, 1990 to 2016
Our World in Data
400 million
300 million
200 million
100 million
0
1990
1995
2000
2005
2010
2016
India
Sudan
Kenya
China
Brazil
Source: OWID based on World Bank, Sustainable Energy for All (SE4ALL) and UNWPP
OurWorldInData.org/energy-production-and-changing-energy-sources • CC BY

Energy use per capita, 2015

Annual average per capita energy consumption is measured in kilowatt-hours per person per year.

Our World in Data



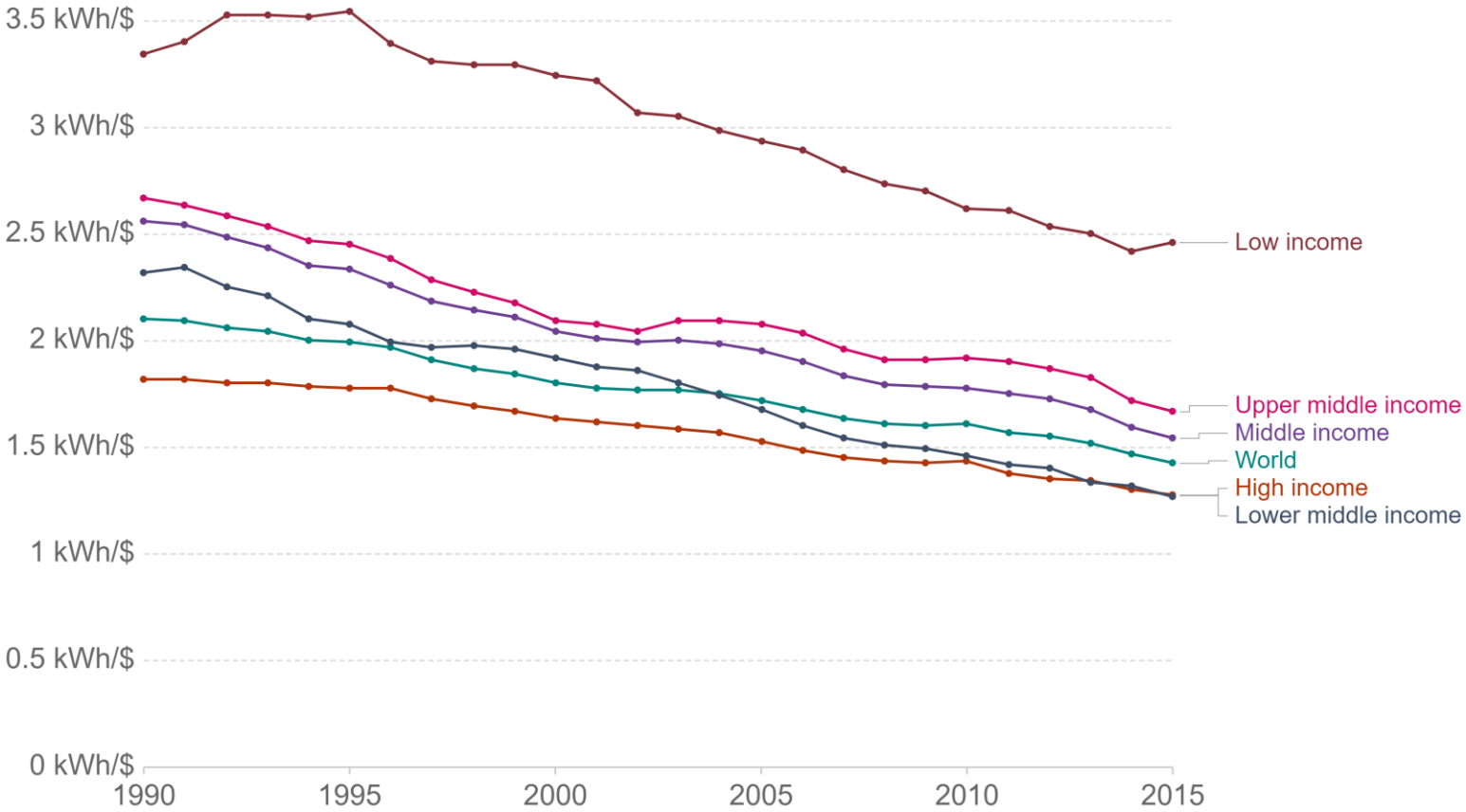


Source: International Energy Agency (IEA) via The World Bank

OurWorldInData.org/energy • CC BY

Energy intensity of economies, 1990 to 2015

Energy intensity level of primary energy is the ratio between energy supply and gross domestic product measured at purchasing power parity. Energy intensity is an indication of how much energy is used to produce one unit of economic output. Lower ratio indicates that less energy is used to produce one unit of output.



Source: World Bank, Sustainable Energy for All (SE4ALL)

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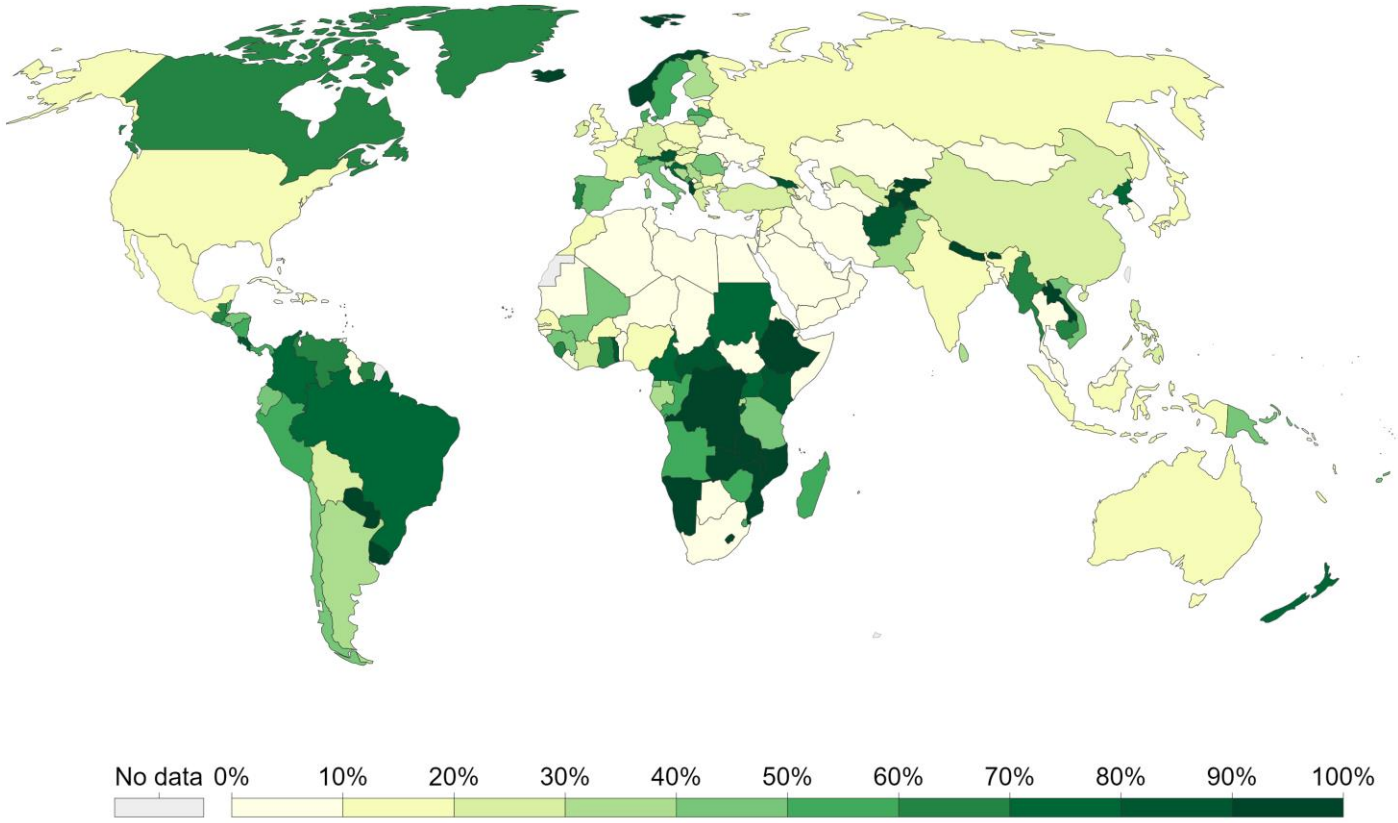
Share of electricity production from renewable sources, 2014

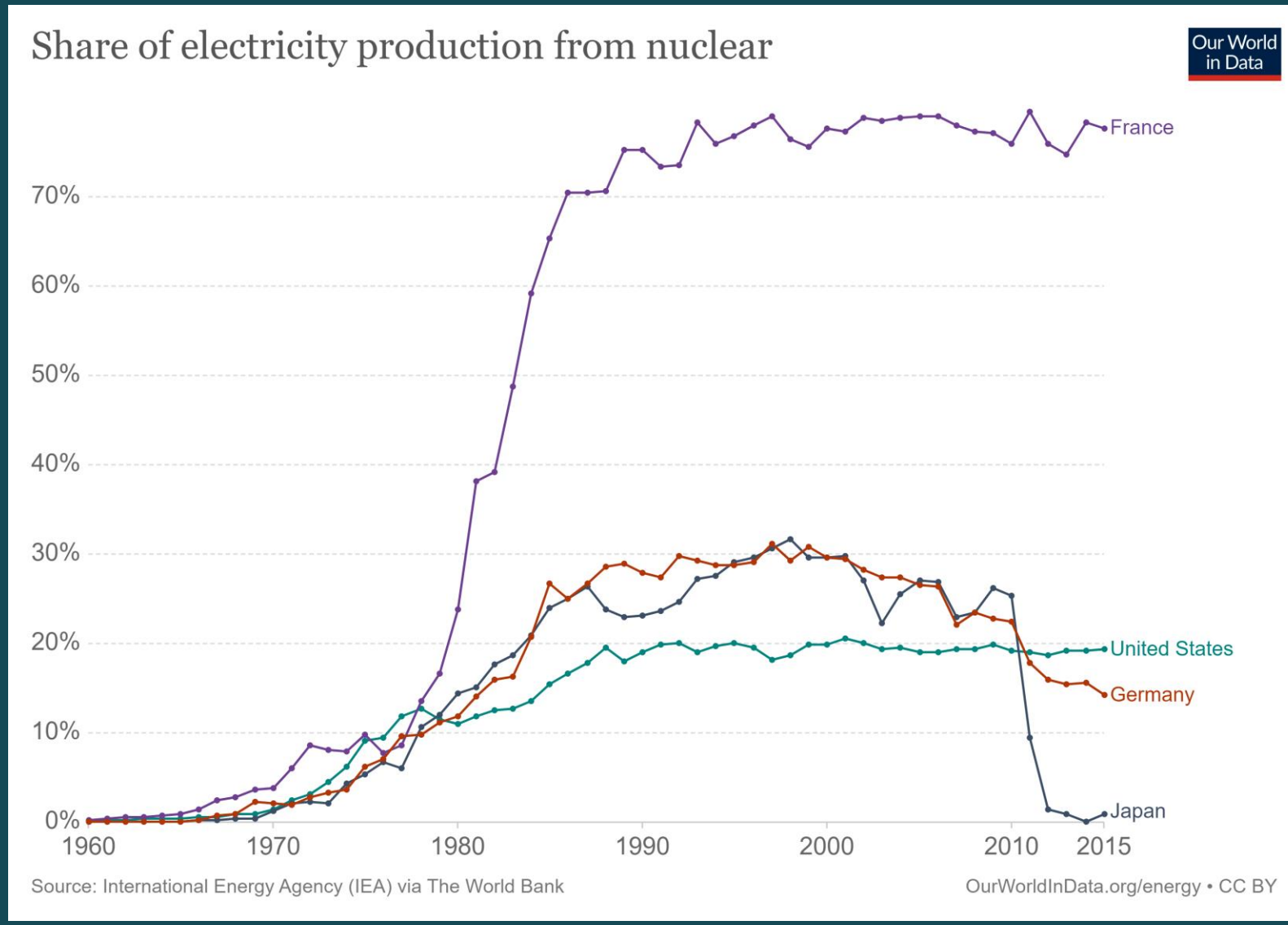
Percentage of electricity produced through renewable sources. This includes biomass, hydropower, solar, wind, geothermal and marine energy. Electricity produced by nuclear sources is not included.

Our World in Data



Source: World Bank, Sustainable Energy for All (SE4ALL)

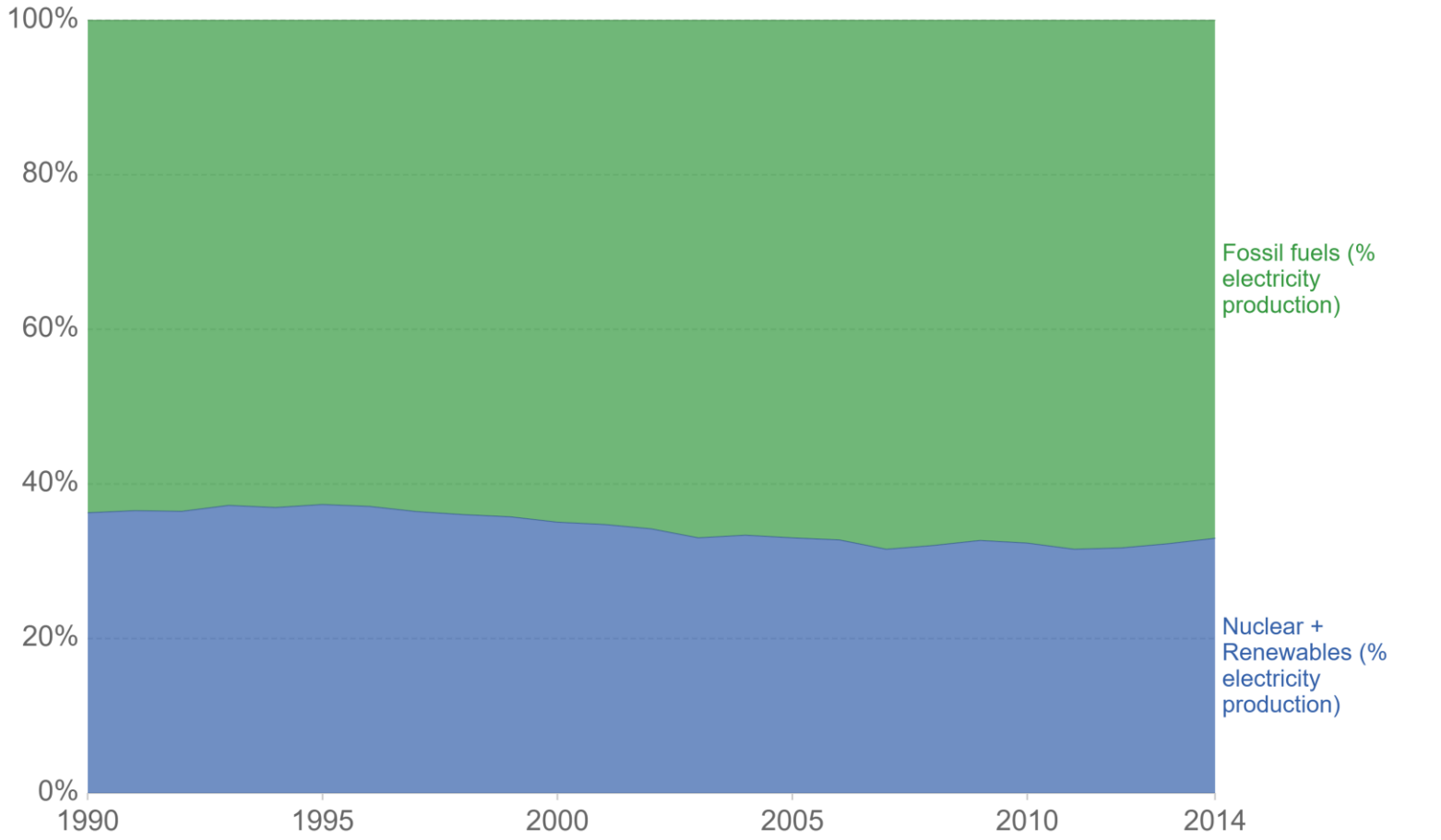
OurWorldInData.org • CC BY


Share of electricity production from nuclear
Our World in Data
France
United States
Germany
Japan
70%
60%
50%
40%
30%
20%
10%
0%
1960
1970
1980
1990
2000
2010
2015
Source: International Energy Agency (IEA) via The World Bank
OurWorldInData.org/energy • CC BY

Global electricity production by source

Global electricity production, measured as the percentage contribution from fossil fuels (coal, oil and gas) and low-carbon sources (nuclear, hydropower, biomass, wind, solar, geothermal and marine power)

Our World in Data



Source: International Energy Agency (IEA) via The World Bank

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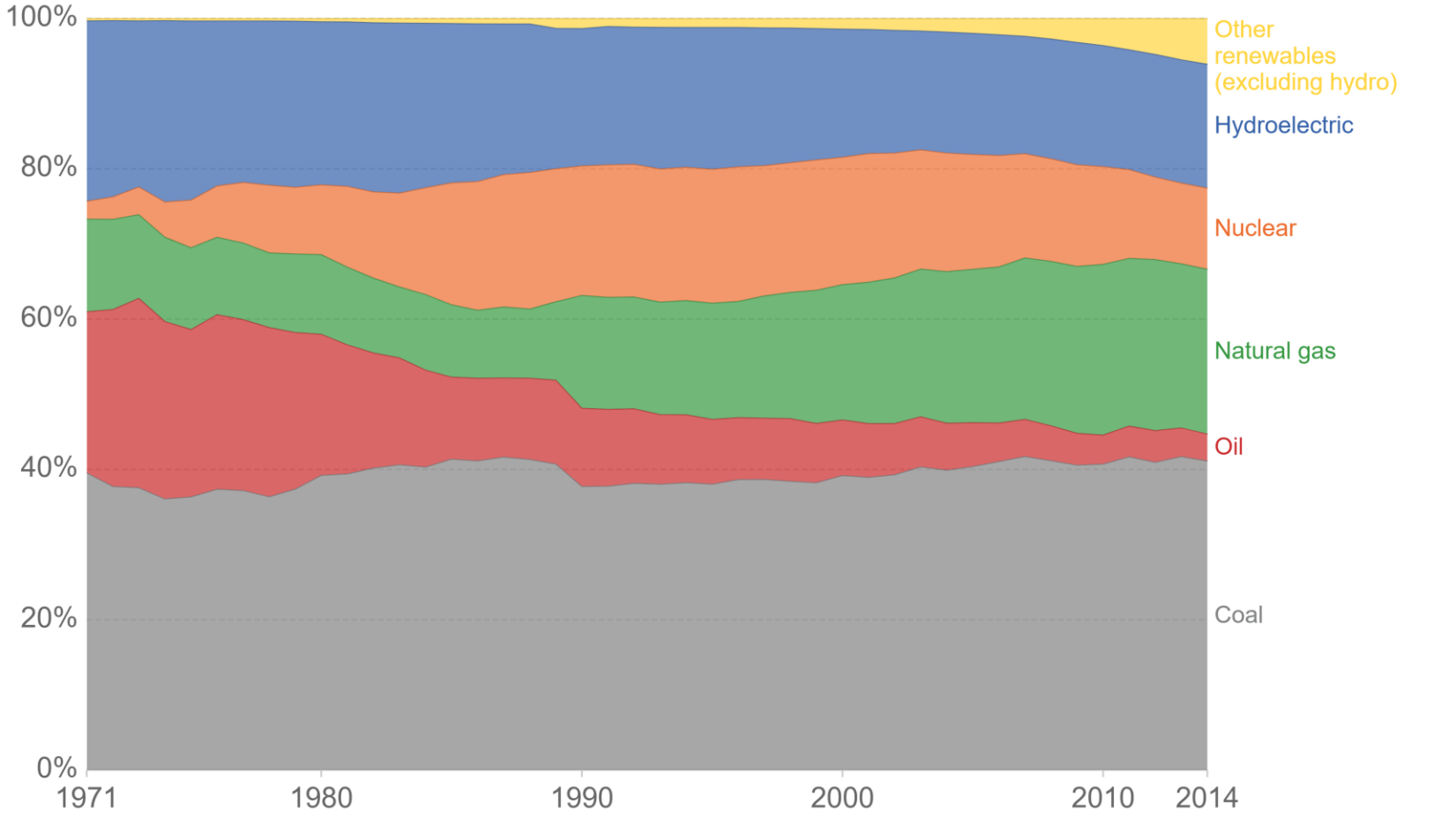
Electricity share by fuel source, World, 1971 to 2015

Electricity production (measured as the percentage of total electricity production) by source (coal, oil, gas, nuclear, hydroelectric power and other renewables). Other renewables in this definition includes biomass, wind, solar, geothermal, and marine power.

Our World in Data



Source: International Energy Agency (IEA) via The World Bank

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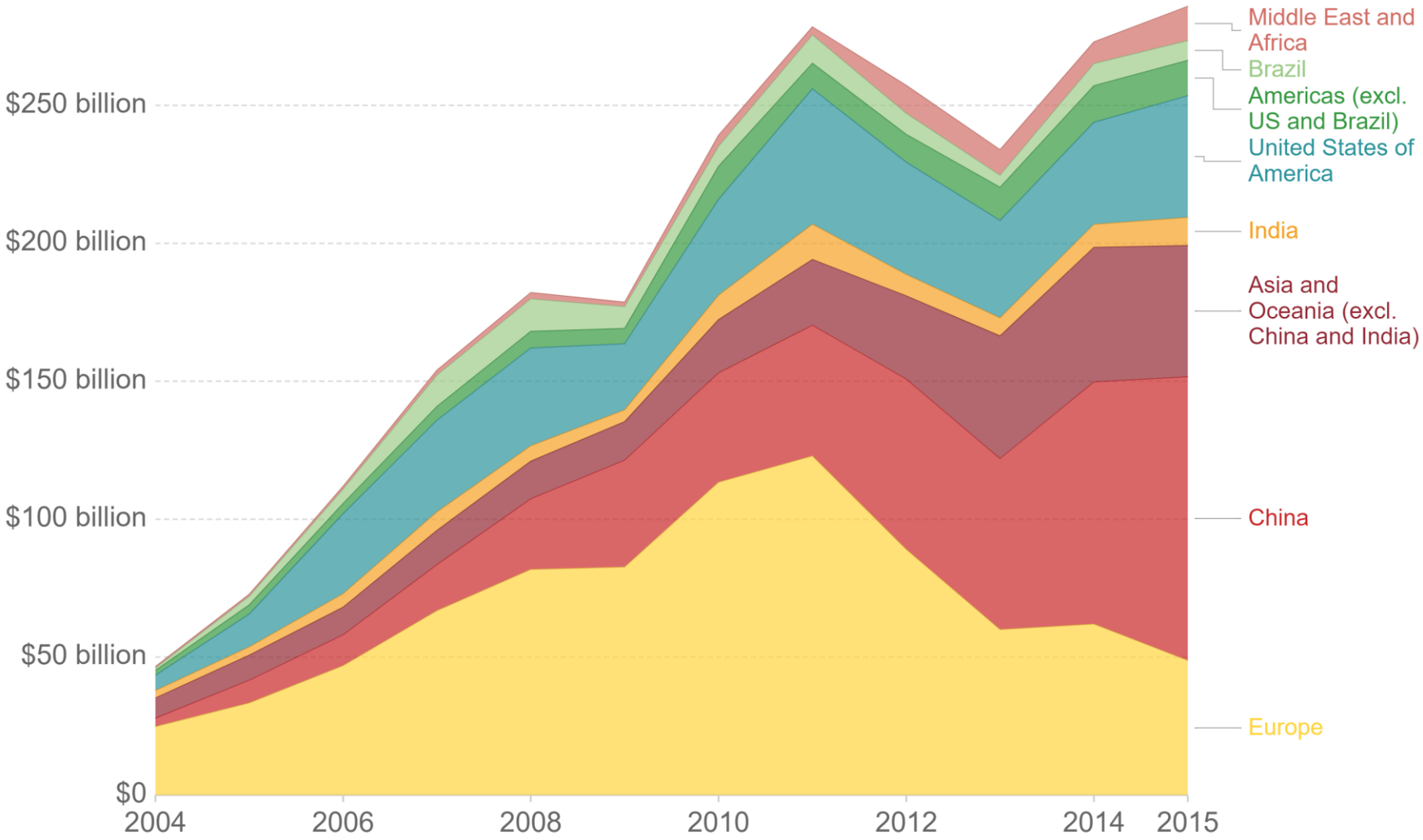
Renewable Energy Investment, 2004 to 2015

Investment in renewable energy technologies per year in billion US dollars by region.



Source: International Renewable Energy Agency, 2017

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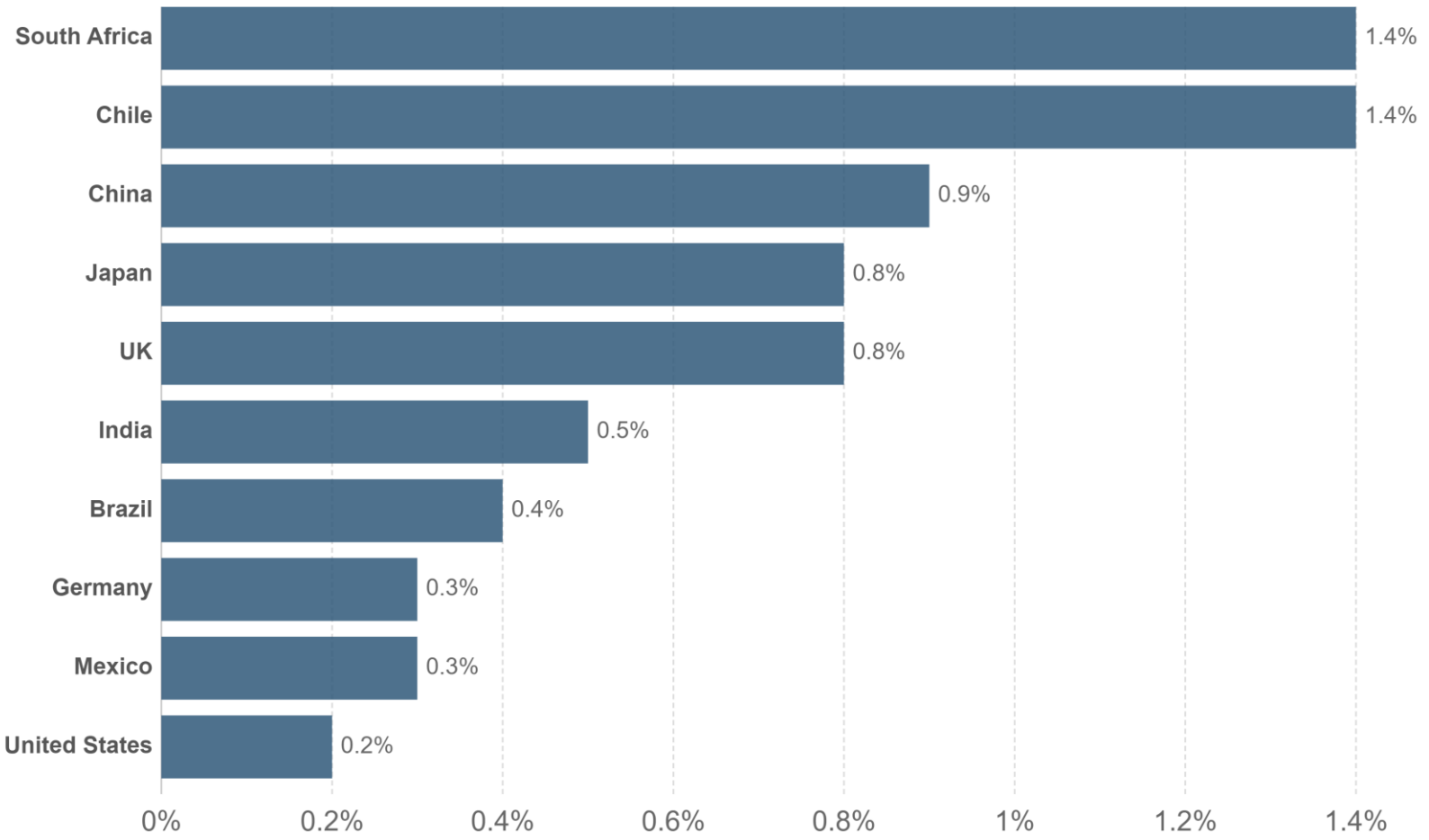
Renewable Energy Investment (% of GDP), 2015

Investment in renewable energy, given as the percentage of each nation's gross domestic product (GDP) in 2015

Our World in Data



Source: Bloomberg New Energy Finance; World Bank

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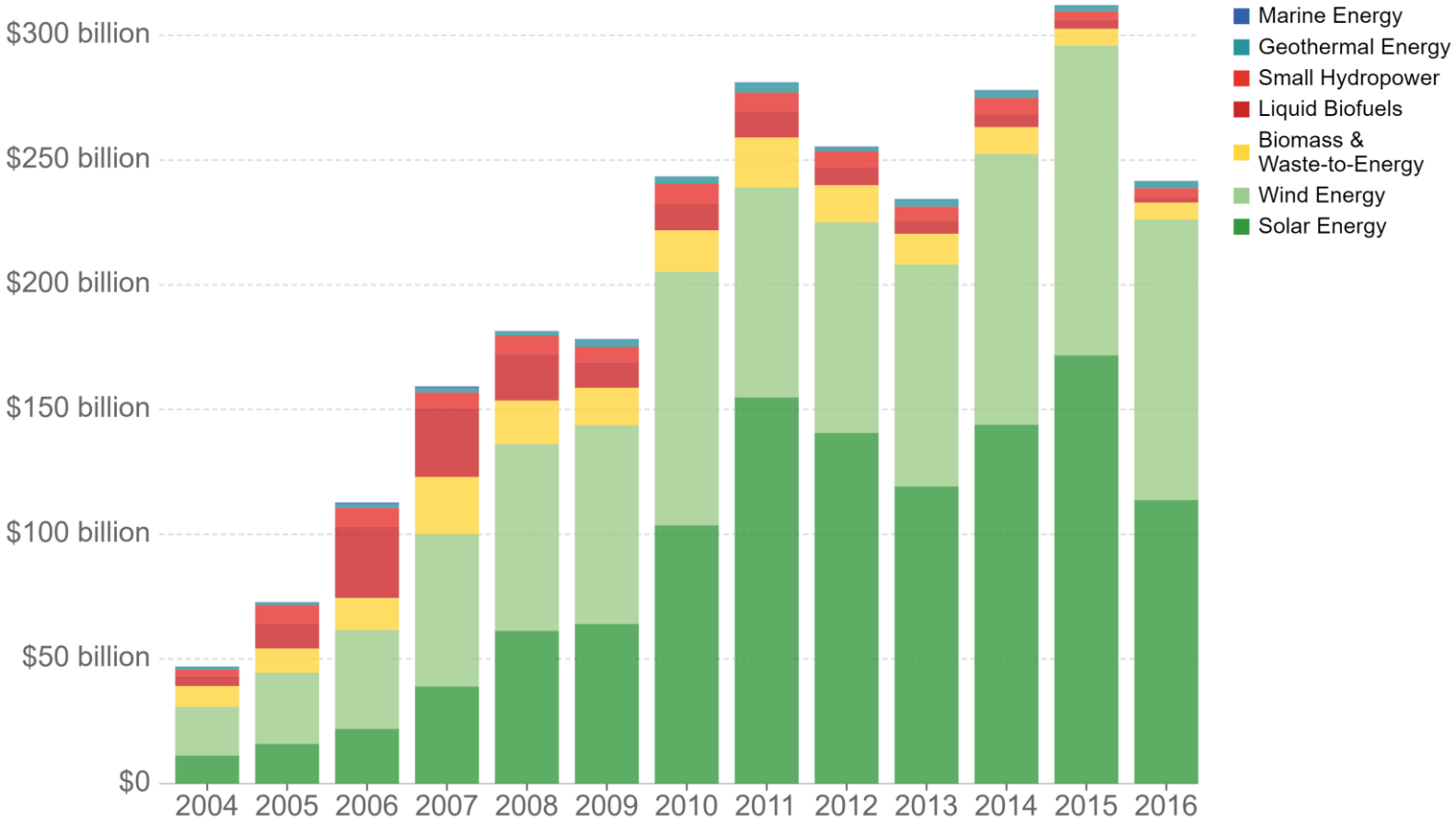
Investment in renewable energy, by technology

Global investment in renewable energy technologies, measured in USD per year. Note investment figures exclude large-scale hydropower schemes.

Our World in Data

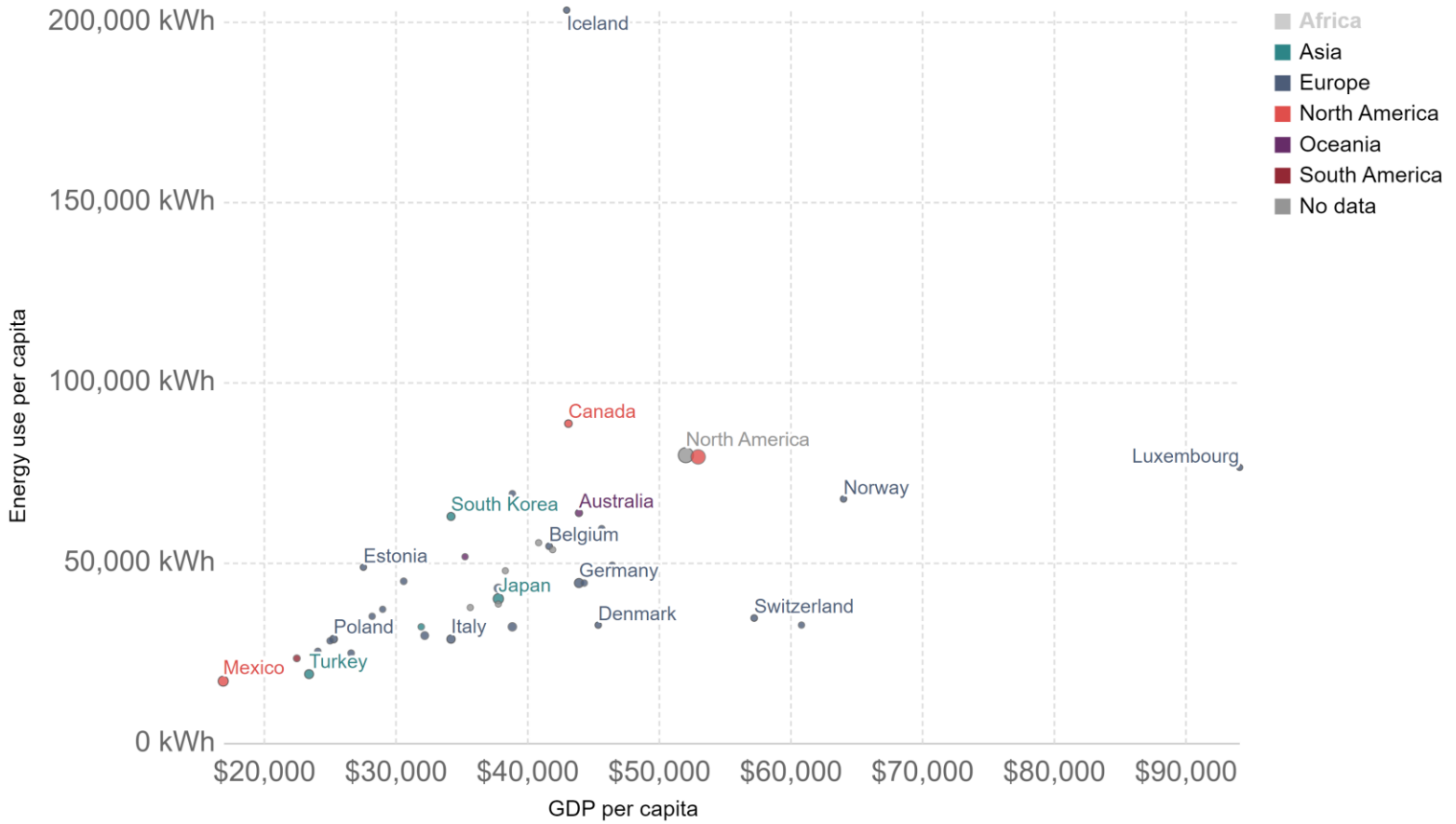


Source: International Renewable Energy Agency (IRENA)

OurWorldInData.org/energy-production-and-changing-energy-sources/ • CC BY

Energy use vs. GDP per capita, 2015

Annual energy use per capita, measured in kilowatt-hours per person vs. gross domestic product (GDP) per capita, measured as 2011 international-$.



Source: International Energy Agency (IEA) via The World Bank OurWorldInData.org/energy-production-and-changing-energy-sources/ • CC BY

Access to electricity vs. GDP per capita, 2016

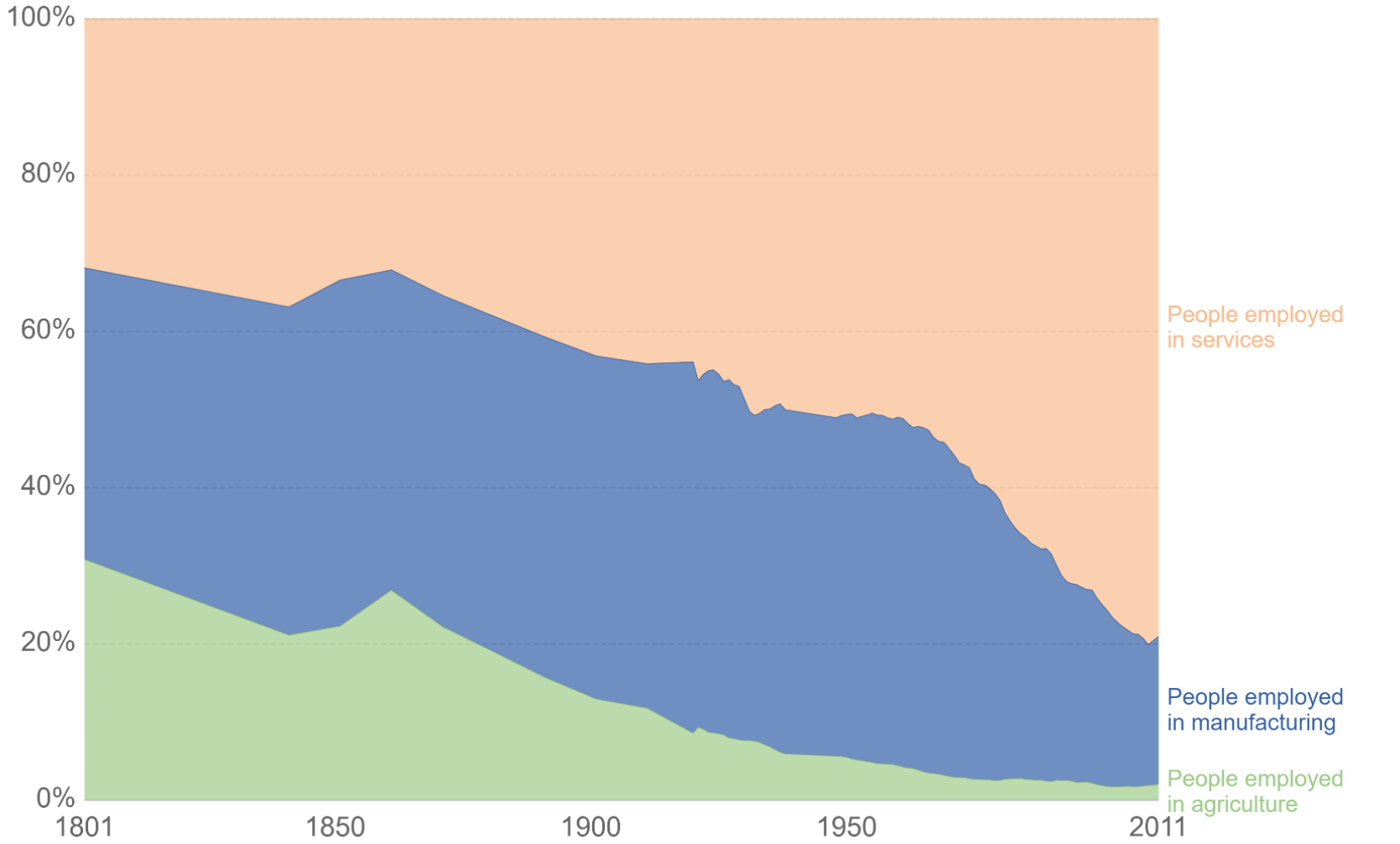
GDP per capita is adjusted for price differences between countries and inflation and measured in international-$.

Source: The World Bank - World Development Indicators (WDI)

OurWorldInData.org/energy-access • CC BY

Employment by economic sector, United Kingdom

Number of people employed by economic sector.

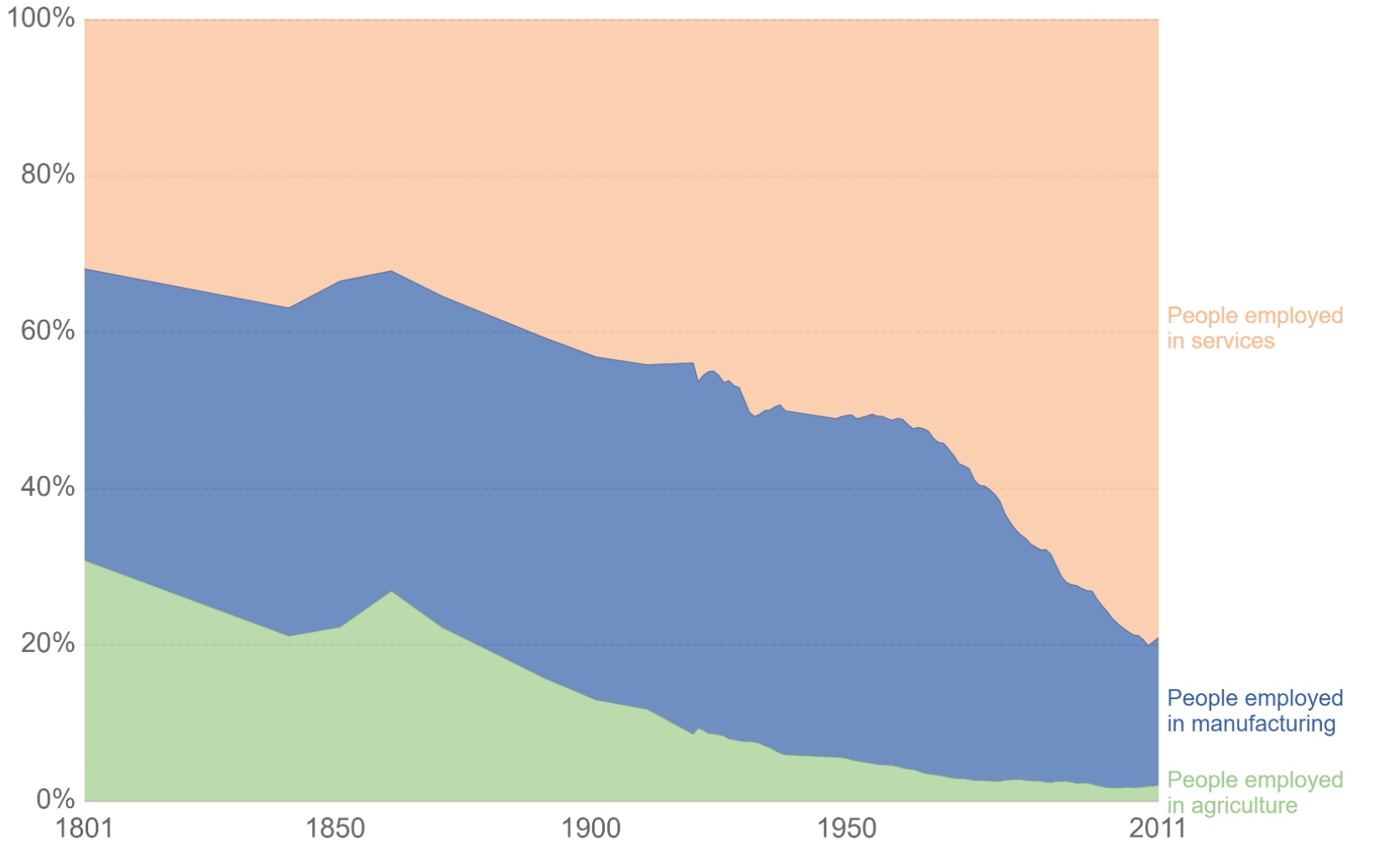


Source: Our World In Data based on Herrendorf et al. (2014)

OurWorldInData.org • CC BY-SA

Employment by economic sector, United Kingdom

Number of people employed by economic sector.



Source: Our World In Data based on Herrendorf et al. (2014)

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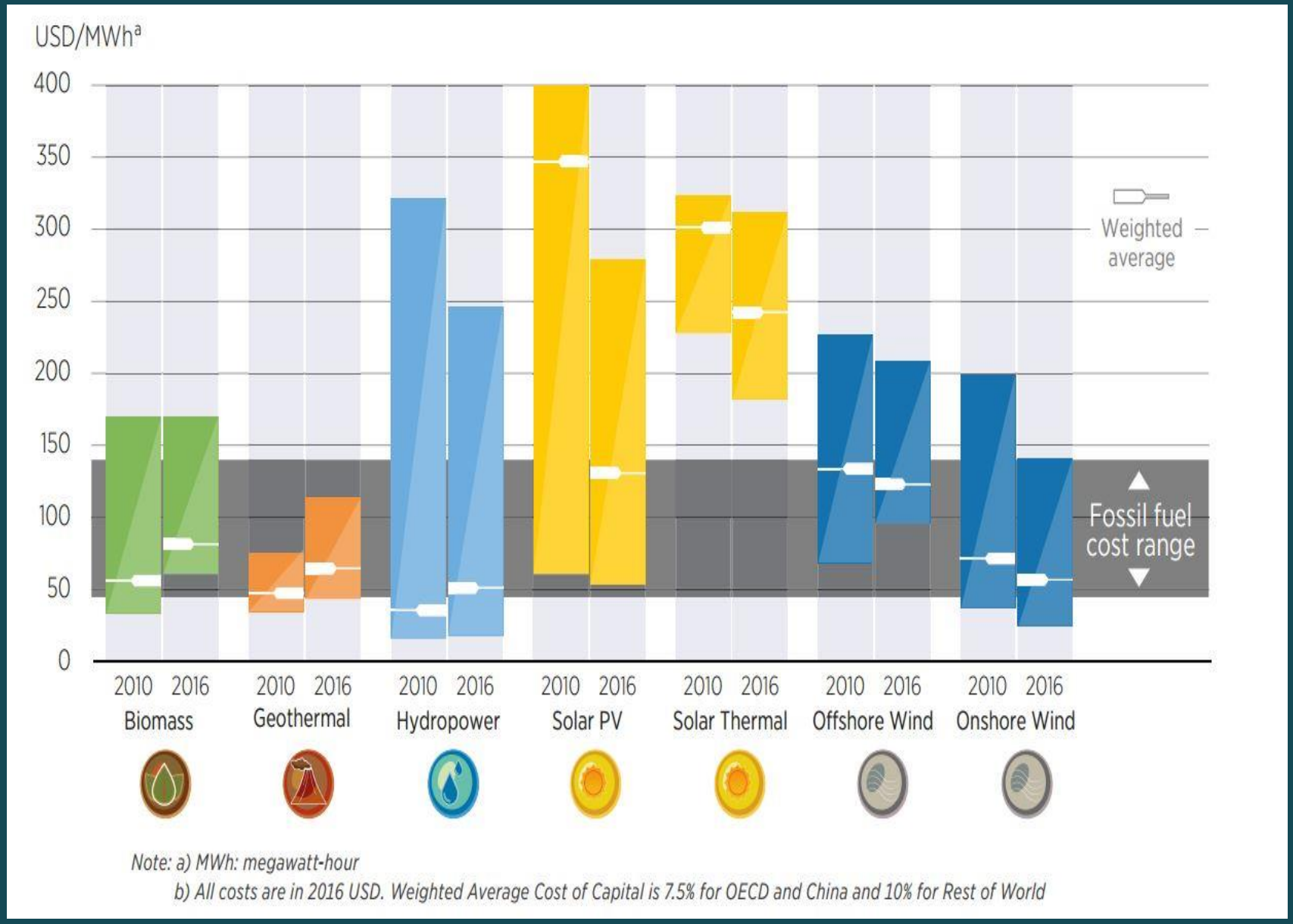
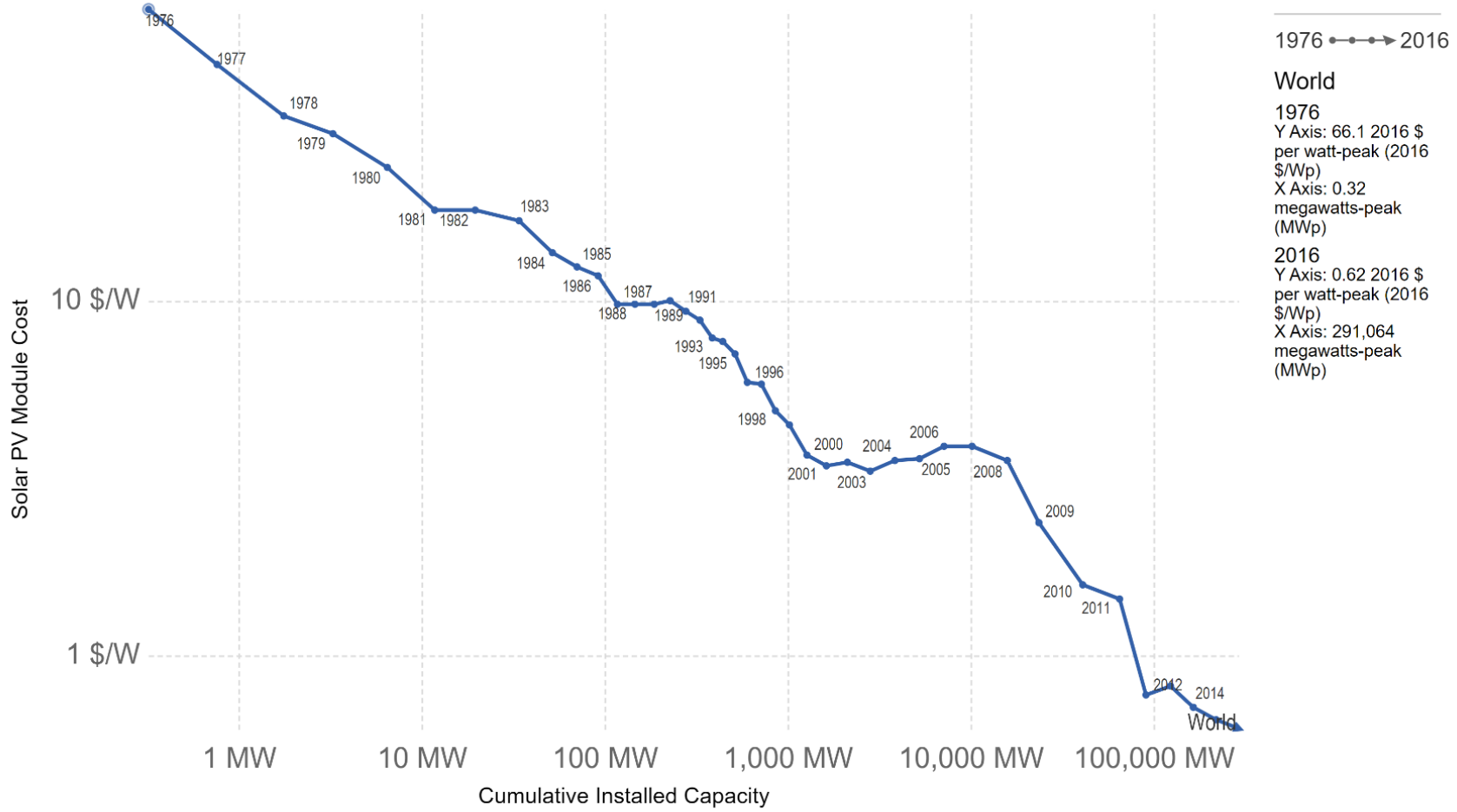


Note: a) MWh: megawatt-hour

b) All costs are in 2016 USD. Weighted Average Cost of Capital is 7.5% for OECD and China and 10% for Rest of World

Solar PV prices vs. cumulative capacity, 1976 to 2016

Solar photovoltaic (PV) module prices (measured in 2016 US$ per watt-peak) versus cumulative installed capacity (measured in megawatts-peak, MWp). This represents the 'learning curve' for solar PV and approximates a 22% reduction in price for every doubling of cumulative capacity.

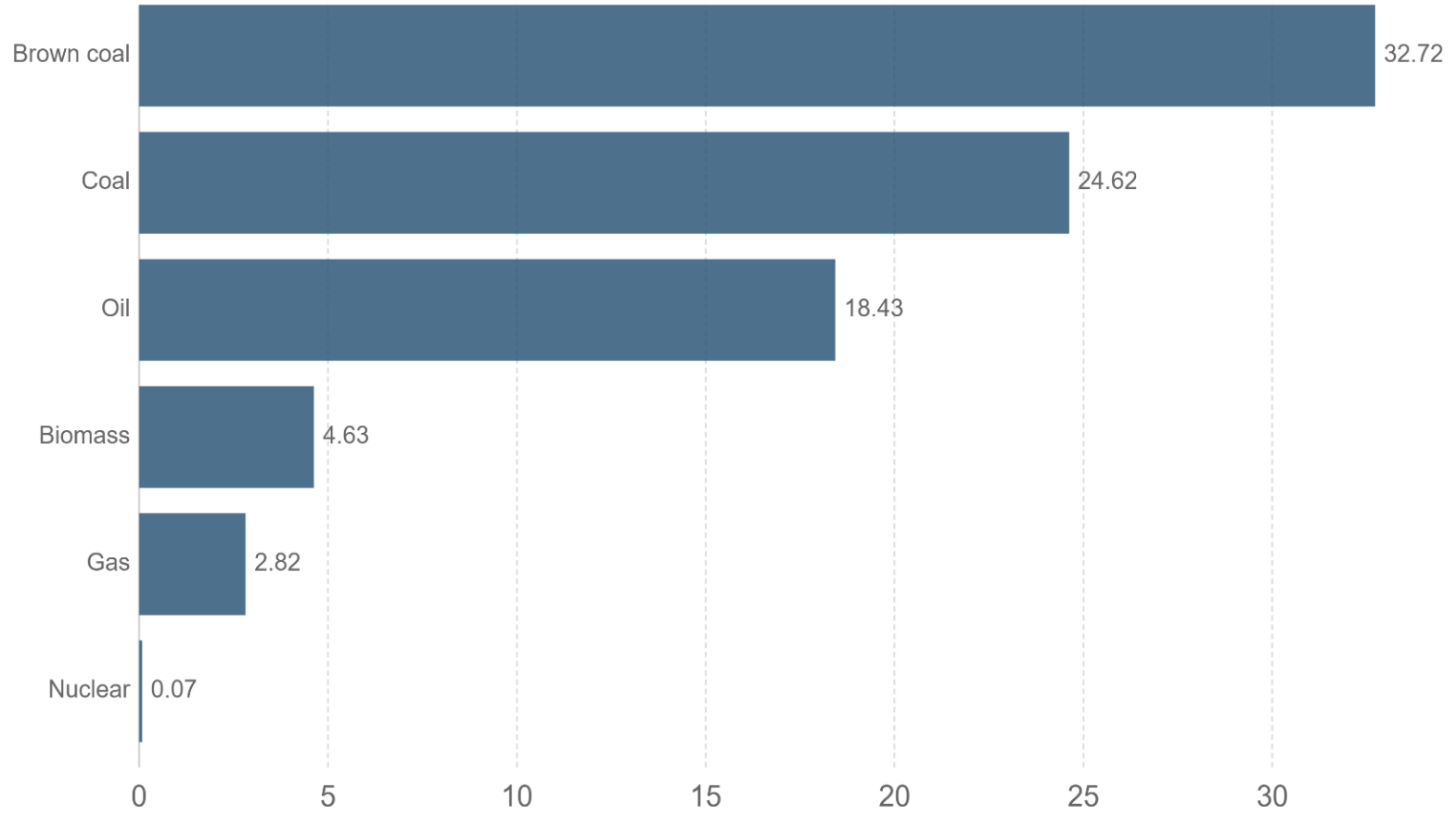


Source: Lafond et al. (2017); IRENA; SolarServer

OurWorldInData.org/energy-production-and-changing-energy-sources/ • CC BY-SA

Death rates from energy production per TWh

Death rates from air pollution and accidents related to energy production, measured in deaths per terawatt hours (TWh)



Source: Markandya and Wilkinson (2007)

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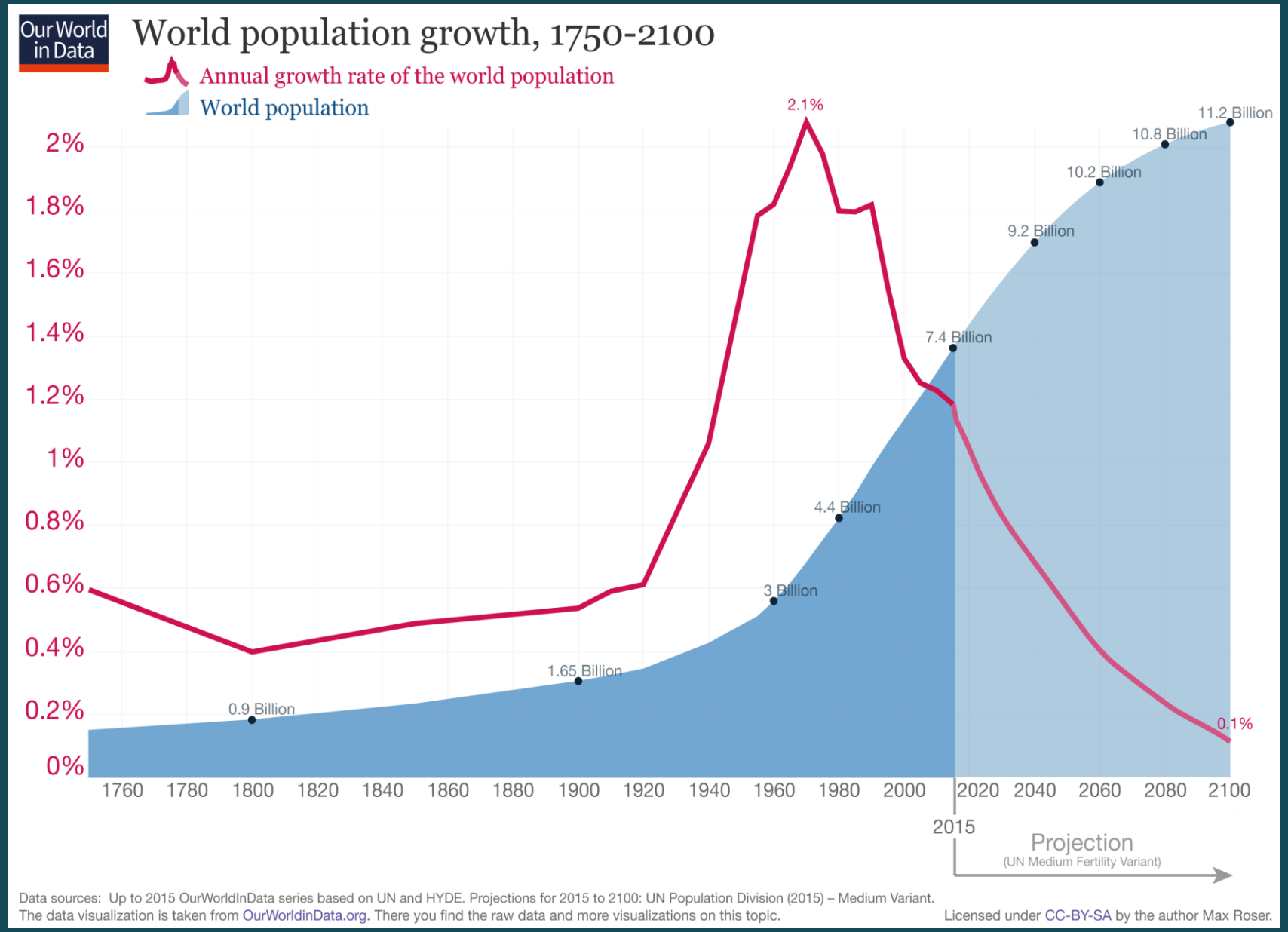
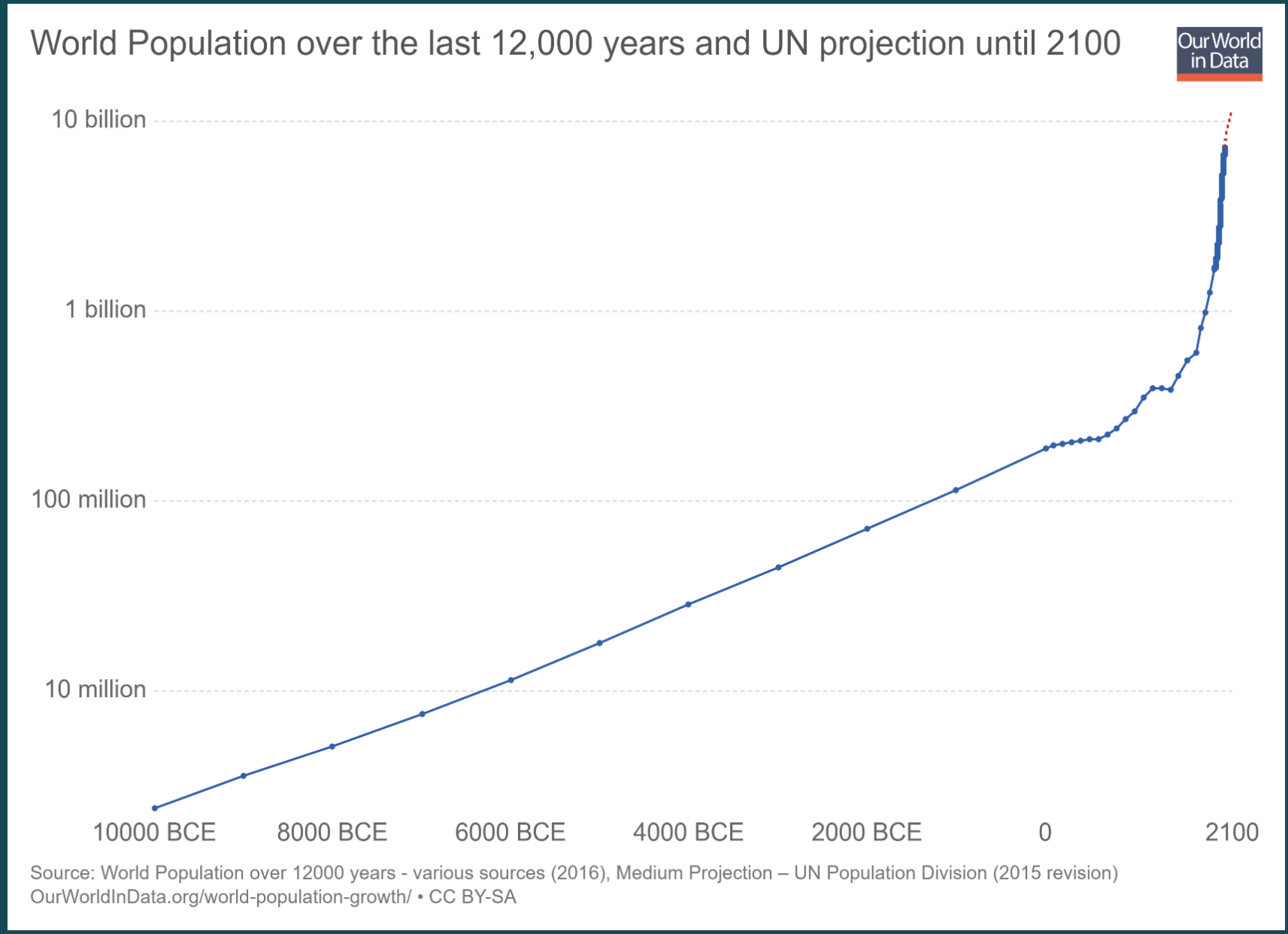
Note: Figures include deaths resulting from accidents in energy production and deaths related to air pollution impacts. Deaths related to air pollution are dominant, typically accounting for greater than 99% of the total.

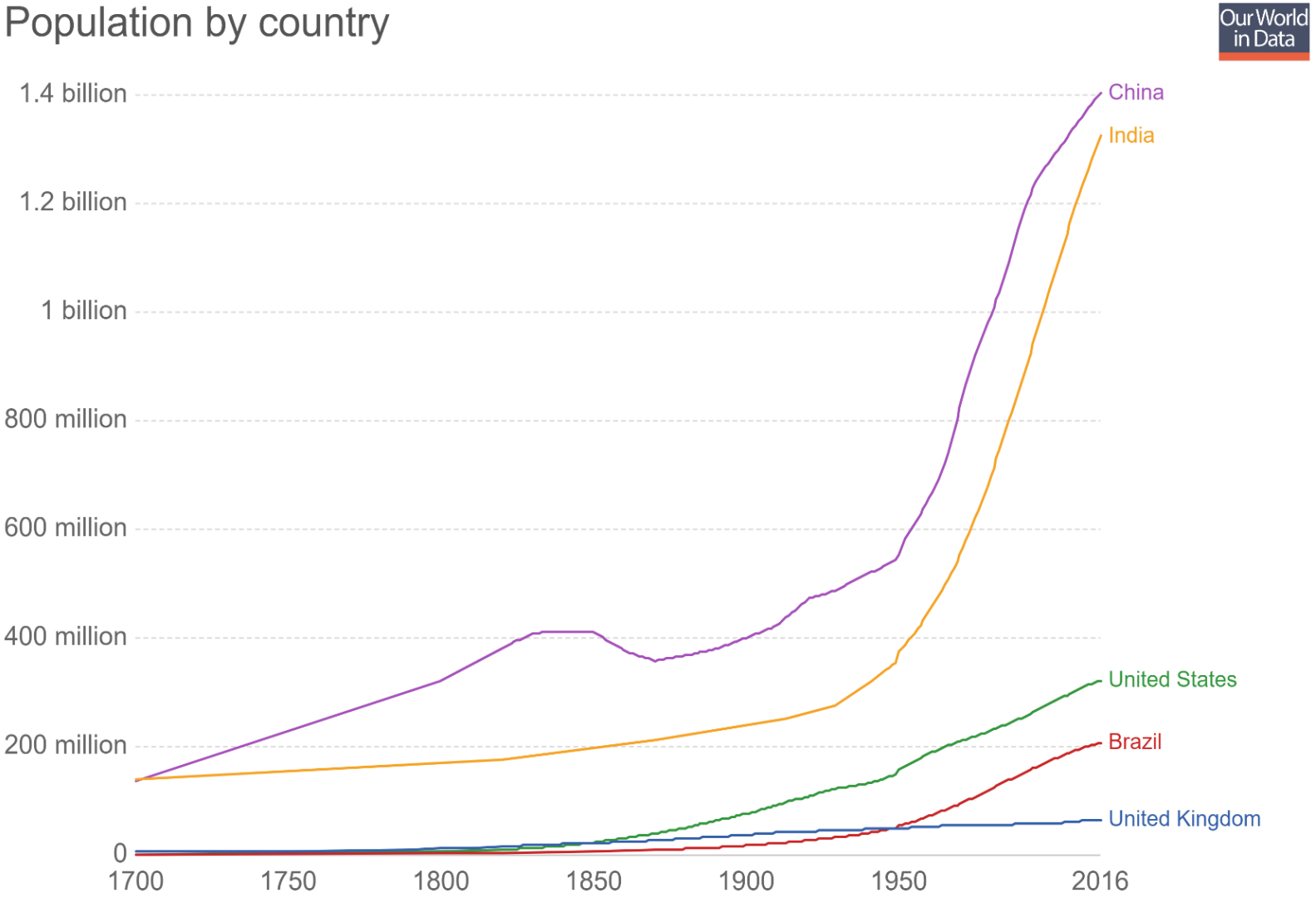
Population Statistics

Subtitle


Our World in Data
World population growth, 1750-2100
Annual growth rate of the world population
World population
2%
1.8%
1.6%
1.4%
1.2%
1%
0.8%
0.6%
0.4%
0.2%
0%
2.1%
0.1%
0.9 Billion
1.65 Billion
3 Billion
4.4 Billion
7.4 Billion
9.2 Billion
10.2 Billion
10.8 Billion
11.2 Billion
1760
1780
1800
1820
1840
1860
1880
1900
1920
1940
1960
1980
2000
2020
2040
2060
2080
2100
2015
Projection
(UN Medium Fertility Variant)
Data sources: Up to 2015 OurWorldInData series based on UN and HYDE. Projections for 2015 to 2100: UN Population Division (2015) – Medium Variant.
The data visualization is taken from OurWorldinData.org. There you find the raw data and more visualizations on this topic.
Licensed under CC-BY-SA by the author Max Roser.


World Population over the last 12,000 years and UN projection until 2100
Our World in Data
10 billion
1 billion
100 million
10 million
10000 BCE
8000 BCE
6000 BCE
4000 BCE
2000 BCE
0
2100
Source: World Population over 12000 years - various sources (2016), Medium Projection – UN Population Division (2015 revision)
OurWorldInData.org/world-population-growth/ • CC BY-SA

Population by country



Source: Gapminder until 1949, UN Population Division from 1950-2016

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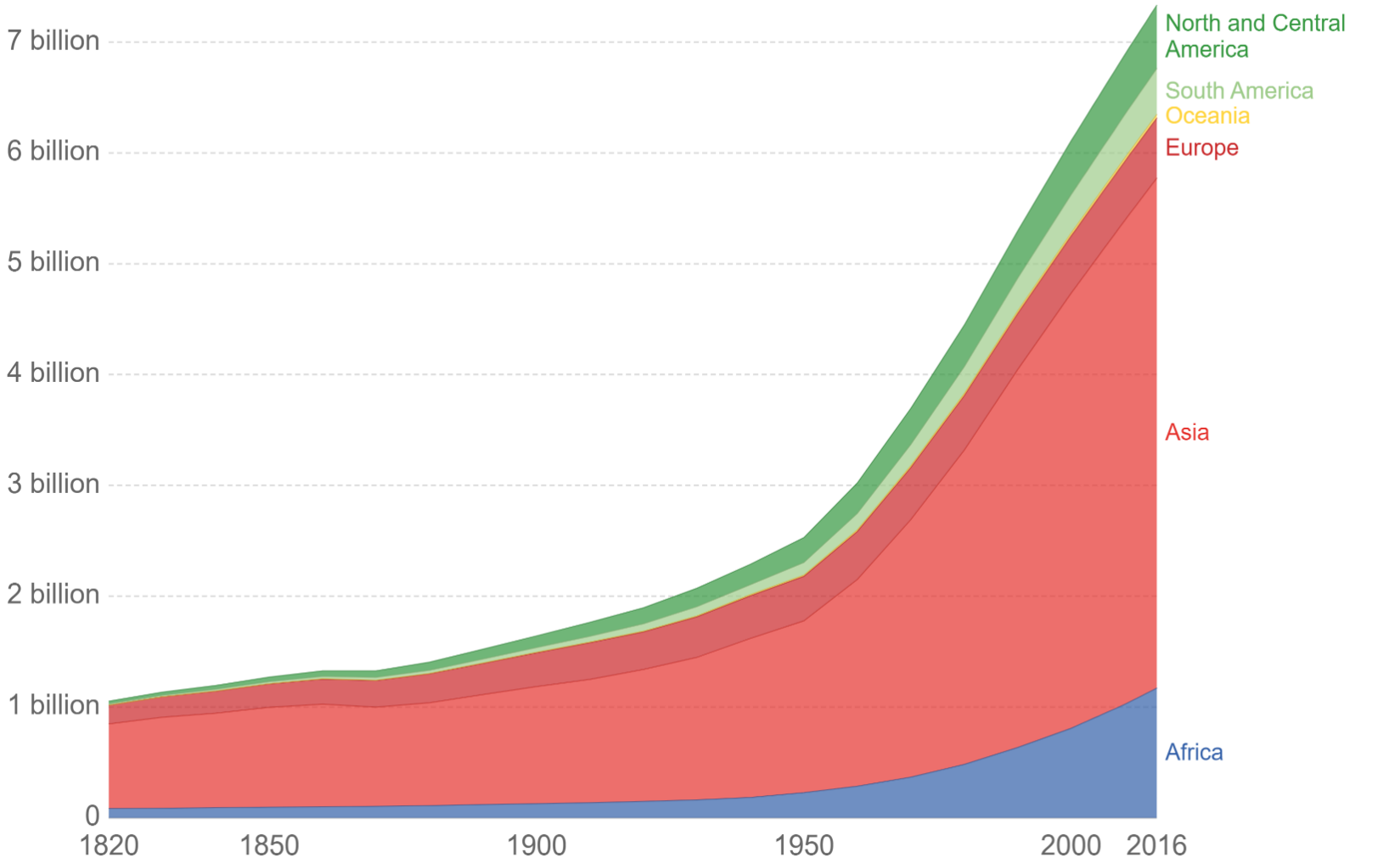
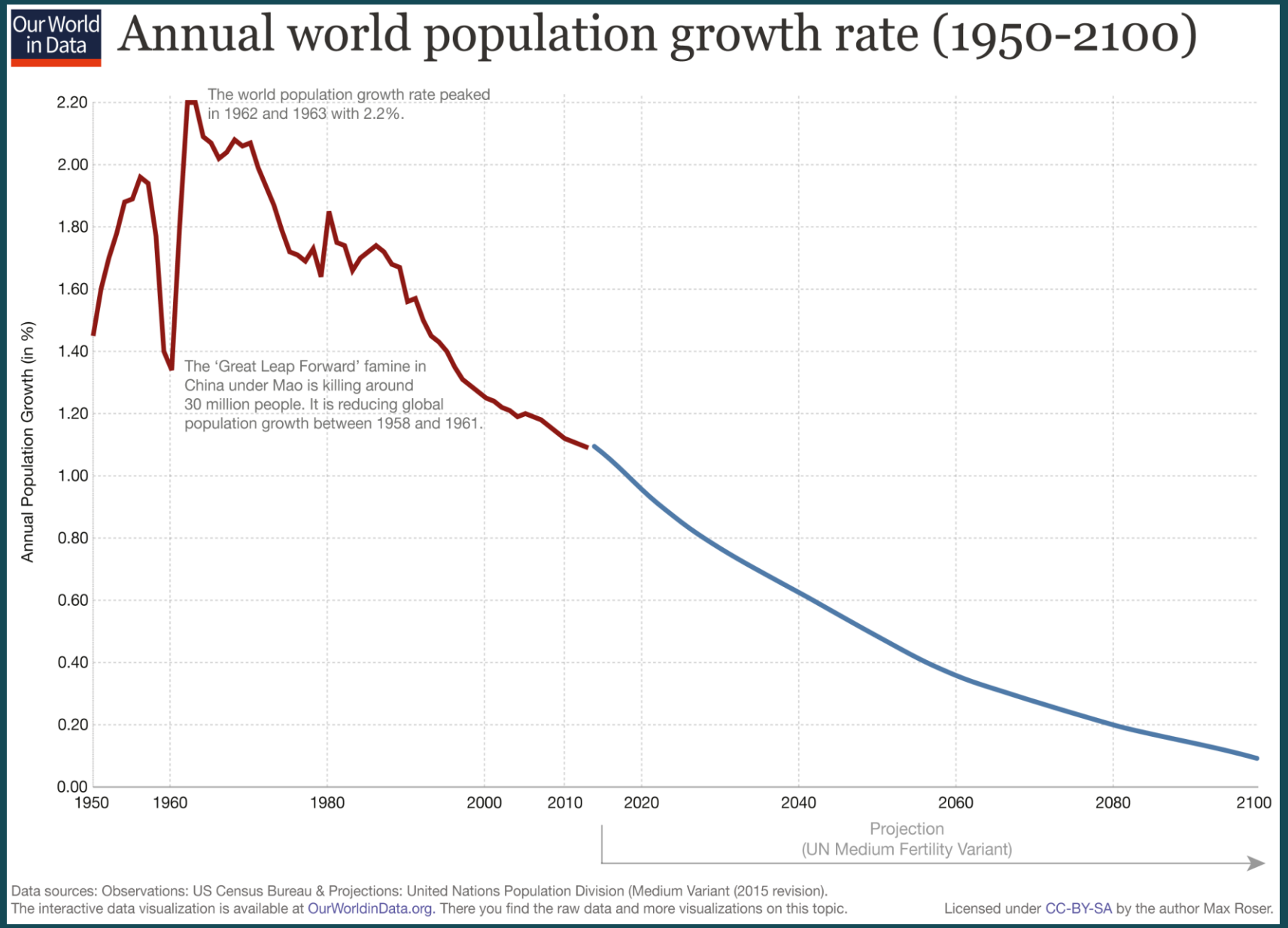
World population by world regions



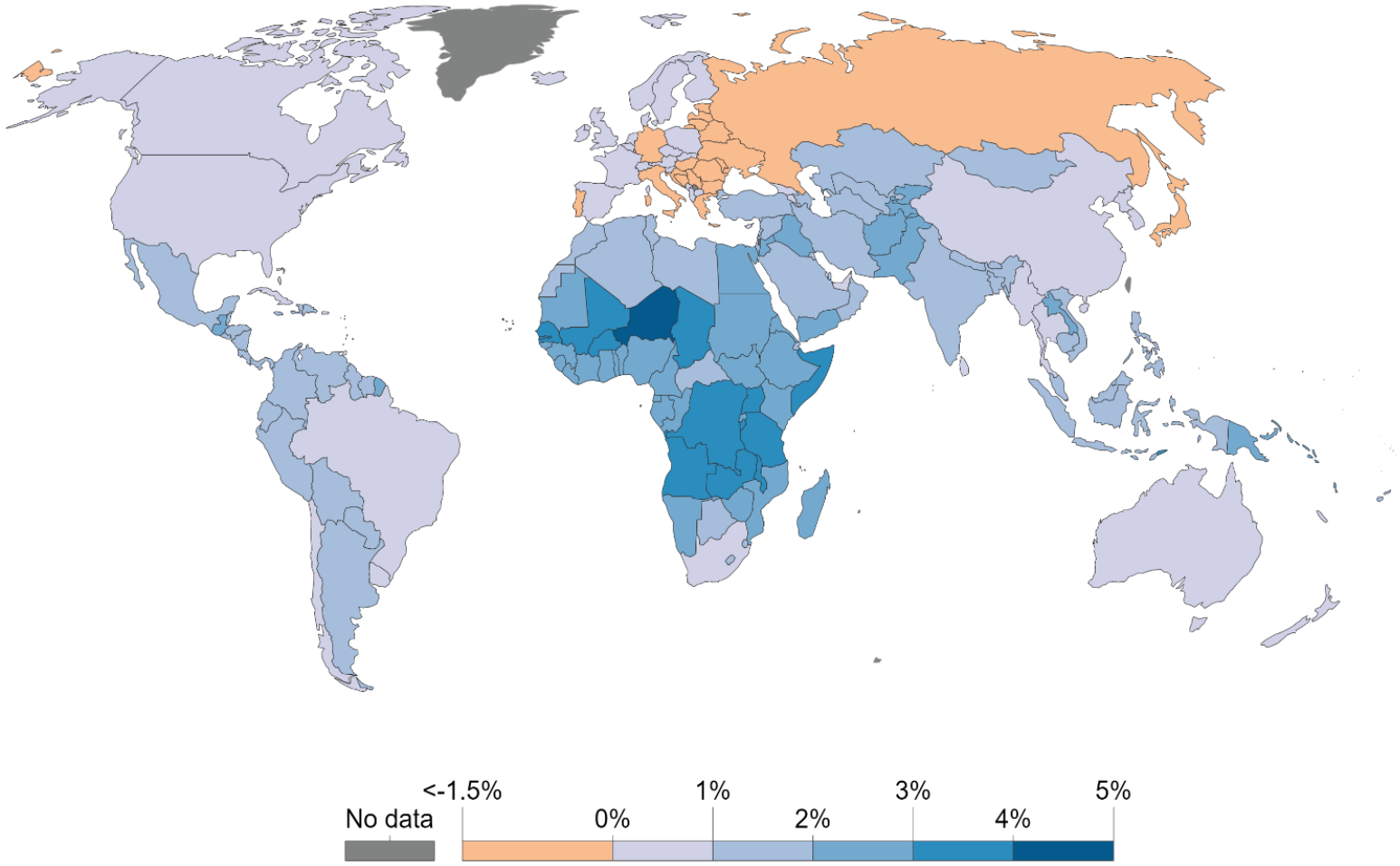
Source: Global Population by Region - HYDE (2016)

OurWorldInData.org/world-population-growth/ • CC BY-SA


Our World in Data
Annual world population growth rate (1950-2100)
The world population growth rate peaked in 1962 and 1963 with 2.2%.
The 'Great Leap Forward' famine in China under Mao is killing around 30 million people. It is reducing global population growth between 1958 and 1961.
Annual Population Growth (in %)
2.20
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1950
1960
1980
2000
2010
2020
2040
2060
2080
2100
Projection
(UN Medium Fertility Variant)
Data sources: Observations: US Census Bureau & Projections: United Nations Population Division (Medium Variant (2015 revision).
The interactive data visualization is available at OurWorldinData.org. There you find the raw data and more visualizations on this topic.
Licensed under CC-BY-SA by the author Max Roser.

Natural population growth, 2015

Natural population growth is the population increase determined by births and deaths. Migration flows are not taken into account.



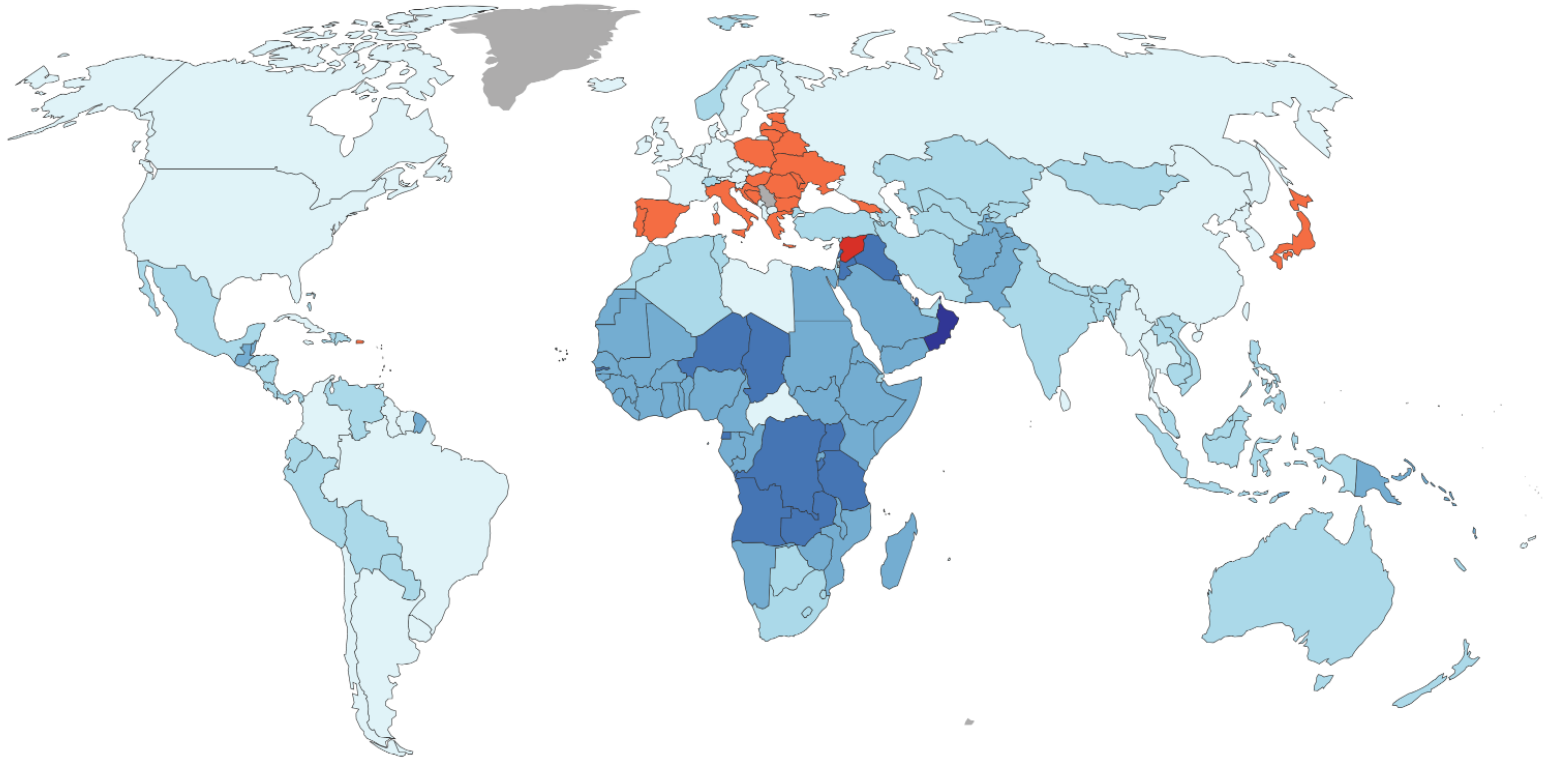
Source: Rate of Natural Population Increase – UN Population Division (2015)

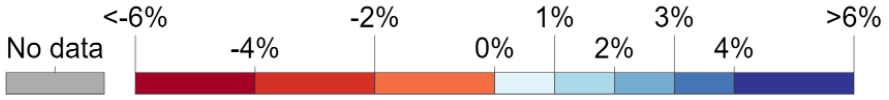
OurWorldInData.org/world-population-growth/ • CC BY-SA

Population growth rate, 2015

Average annual rate of population change (including the UN's 'Medium variant' projections until 2100)

Our World in Data





Source: UN Population Division (2017 Revision)

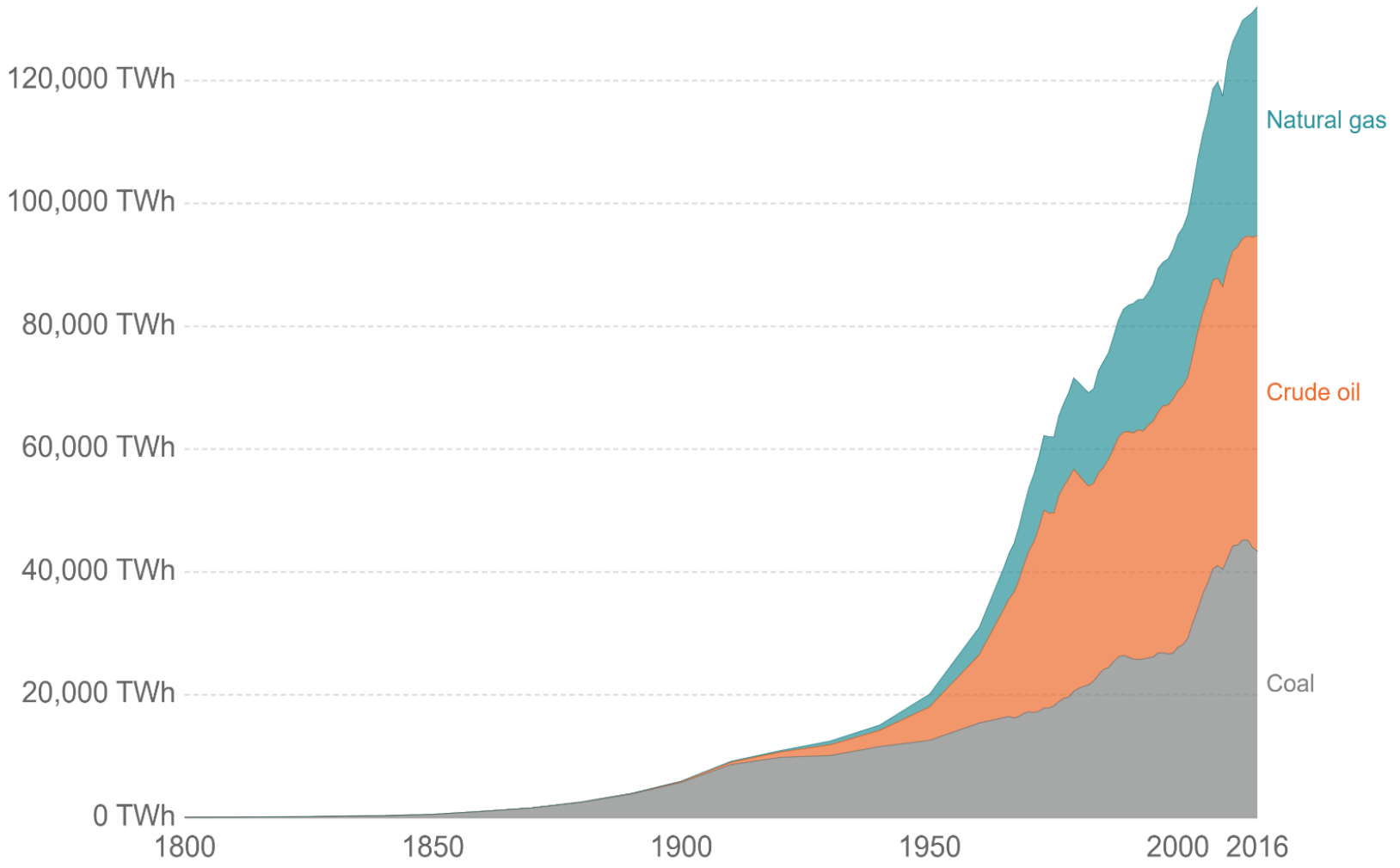
OurWorldInData.org/world-population-growth/ • CC BY-SA

Fossil Fuels

Subtitle

Global fossil fuel consumption

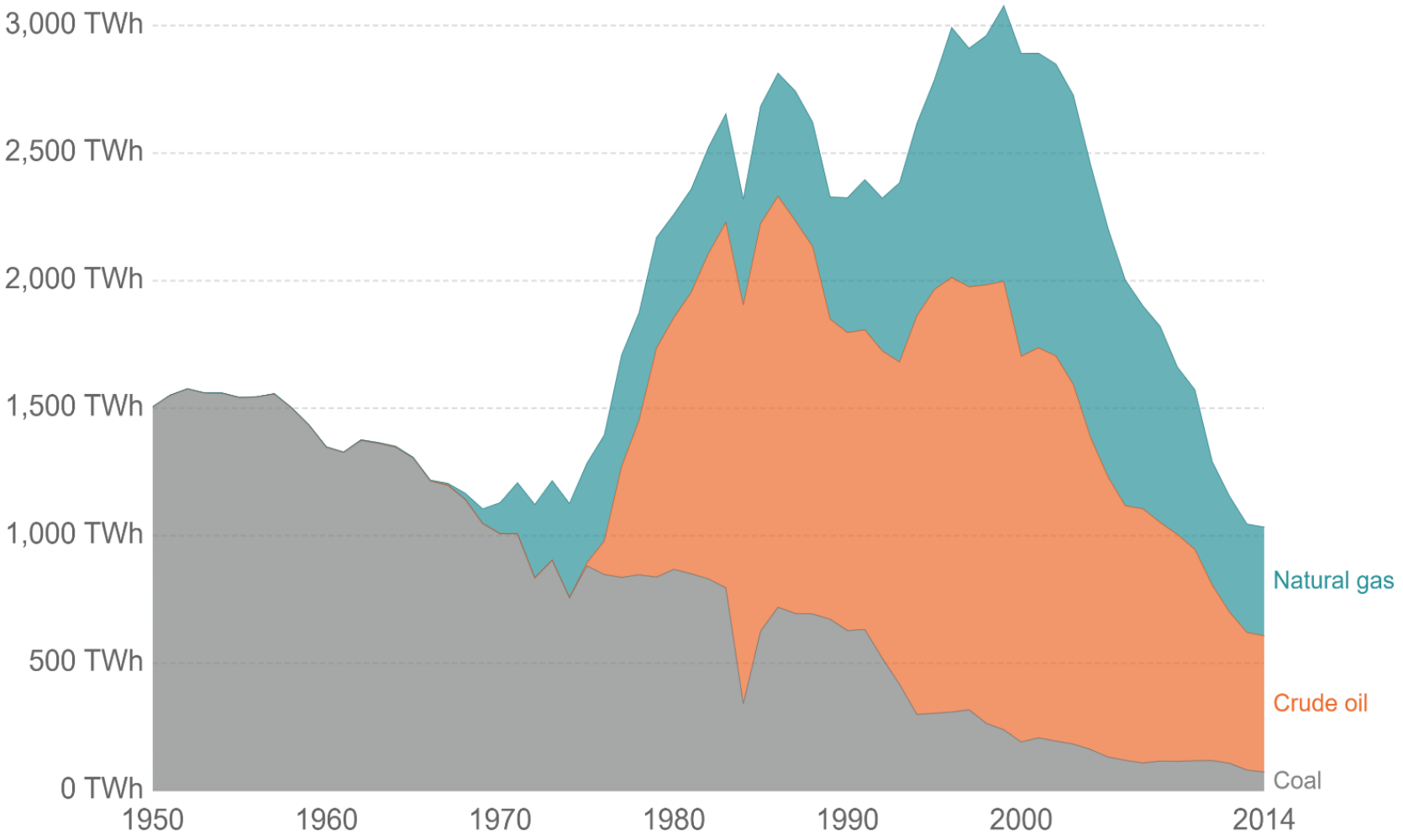
Global primary energy consumption by fossil fuel source, measured in terawatt-hours (TWh).



Source: Vaclav Smil (2017). Energy Transitions: Global and National Perspective & BP Statistical Review of World Energy
OurWorldInData.org/fossil-fuels/ • CC BY-SA

Fossil fuel production over the long-term, United Kingdom

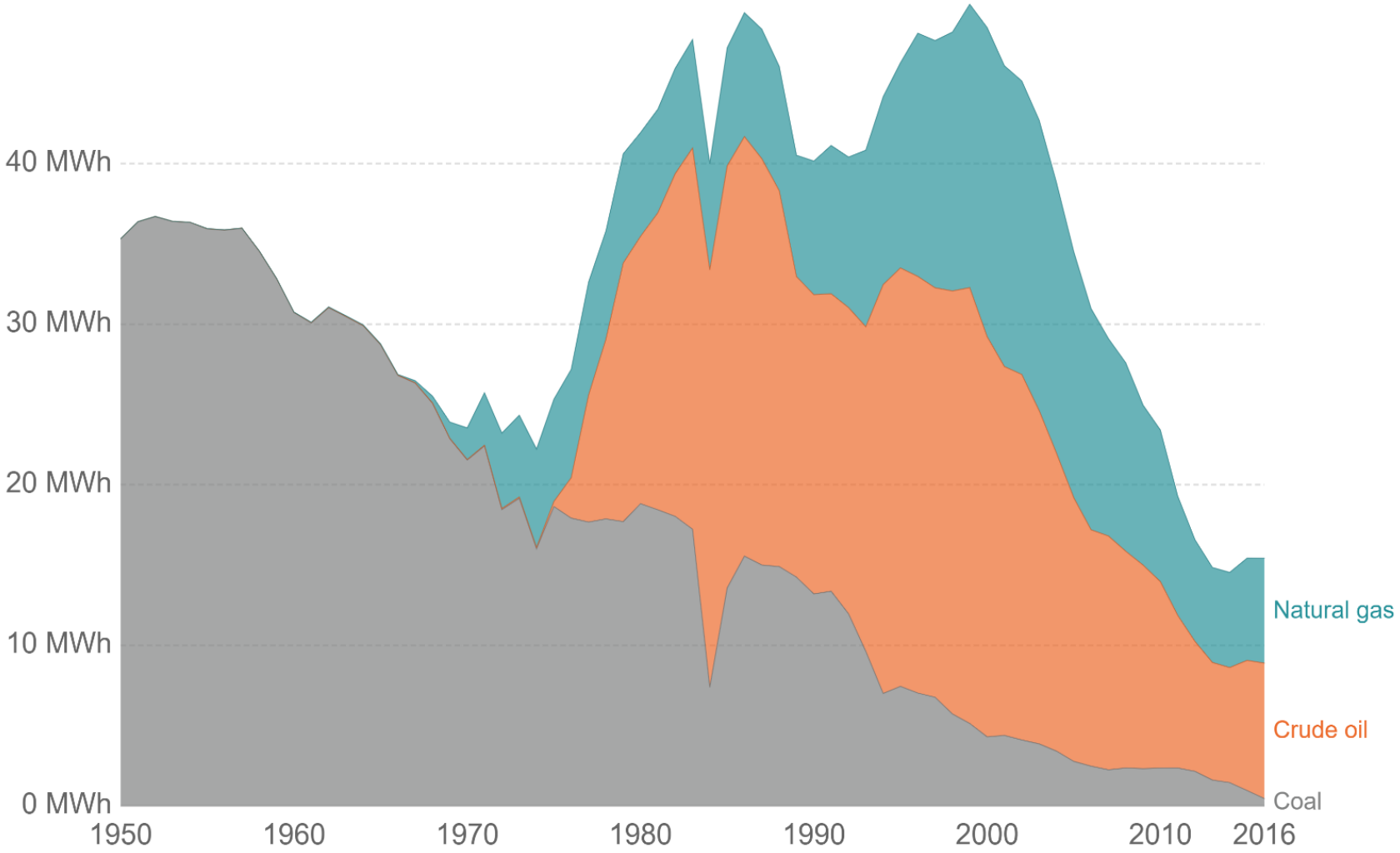
Total fossil fuel production - differentiated by coal, oil and natural gas - by country over the long-run, measured in terawatt-hour (TWh) equivalents per year.



Source: Coal production - The SHIFT Project, Oil production - Etemad & Luciana, Gas production - Etemad & Luciana
OurWorldInData.org/fossil-fuels/ • CC BY-SA

Fossil fuel production per capita, United Kingdom

Average fossil fuel production per capita across countries and regions, measured in megawatt-hours (MWh) per person per year. Fossil fuel consumption has been categorised by coal, oil and natural gas sources.

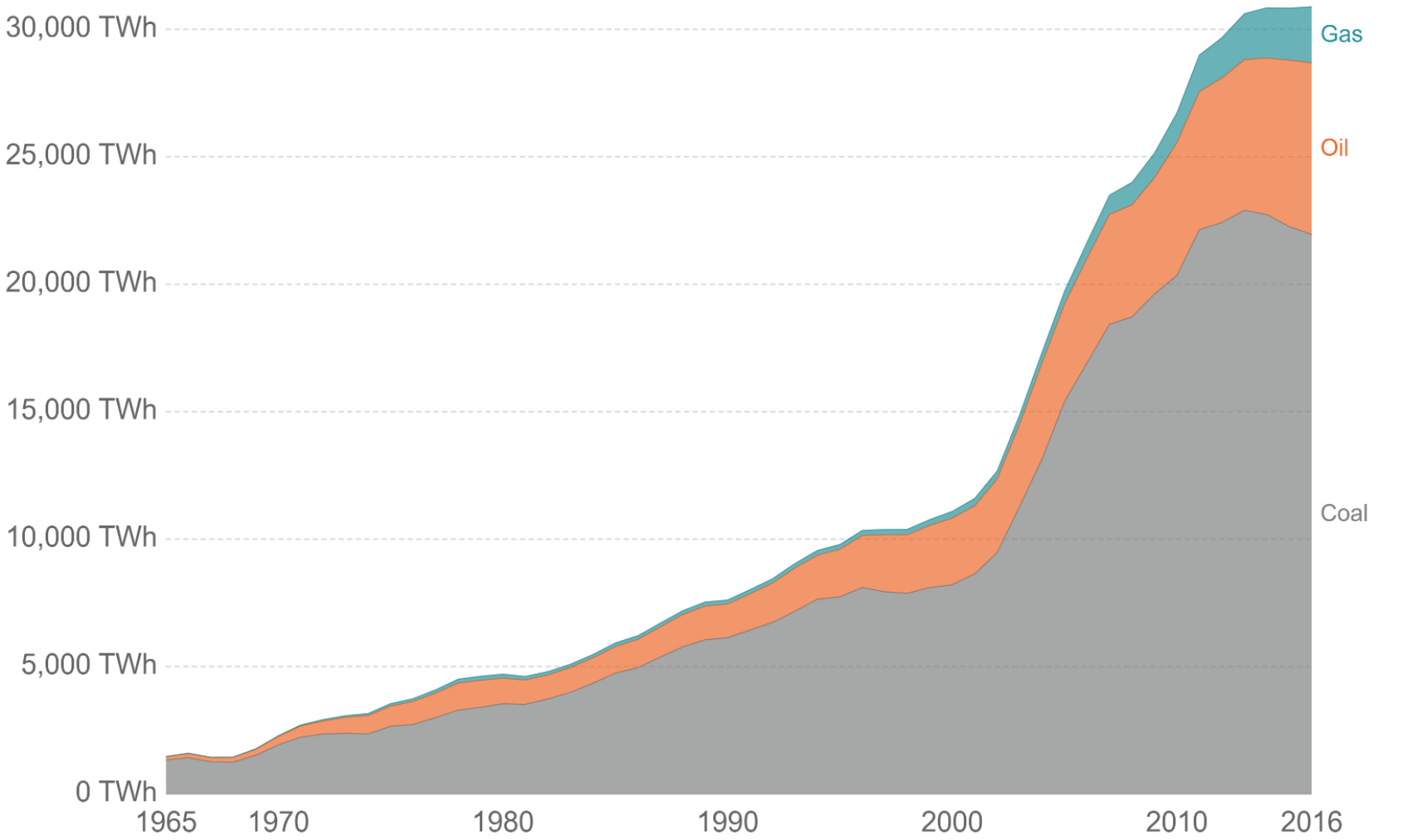


Source: Long-term per capita fossil fuels - OWID based on UN, Gapminder, BP, Etemad & Luciana

OurWorldInData.org/fossil-fuels/ • CC BY-SA

Fossil fuel consumption by fuel type, China

Fossil fuel consumption from coal, oil and gas sources by country or region, measured in terawatt-hour (TWh) equivalents per year.

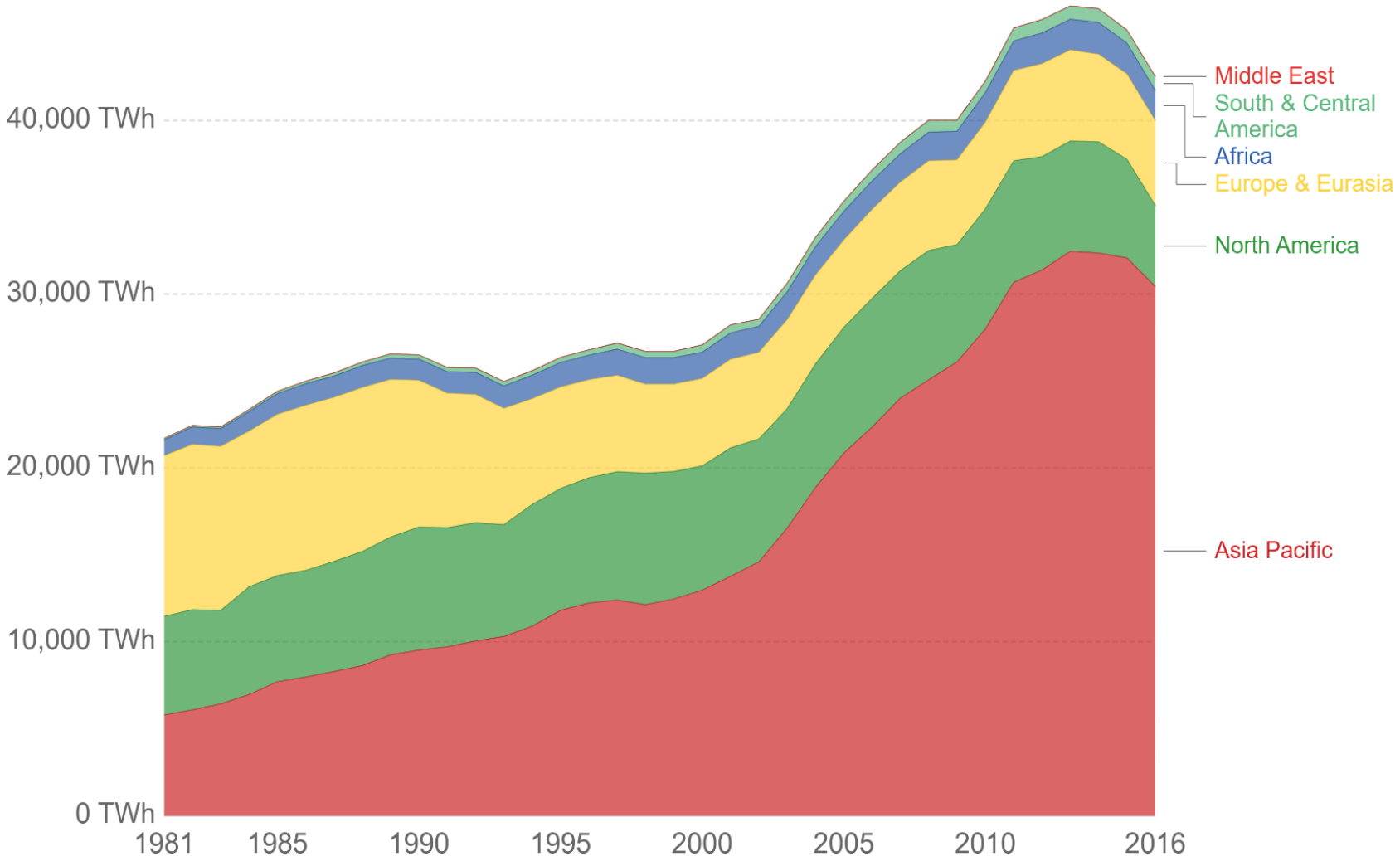


Source: BP Statistical Review of Global Energy

OurWorldInData.org/fossil-fuels/ • CC BY-SA

Coal production by region, terawatt-hours (TWh)

Annual coal production, measured in terawatt-hour (TWh) equivalents.



Source: BP Statistical Review of Global Energy

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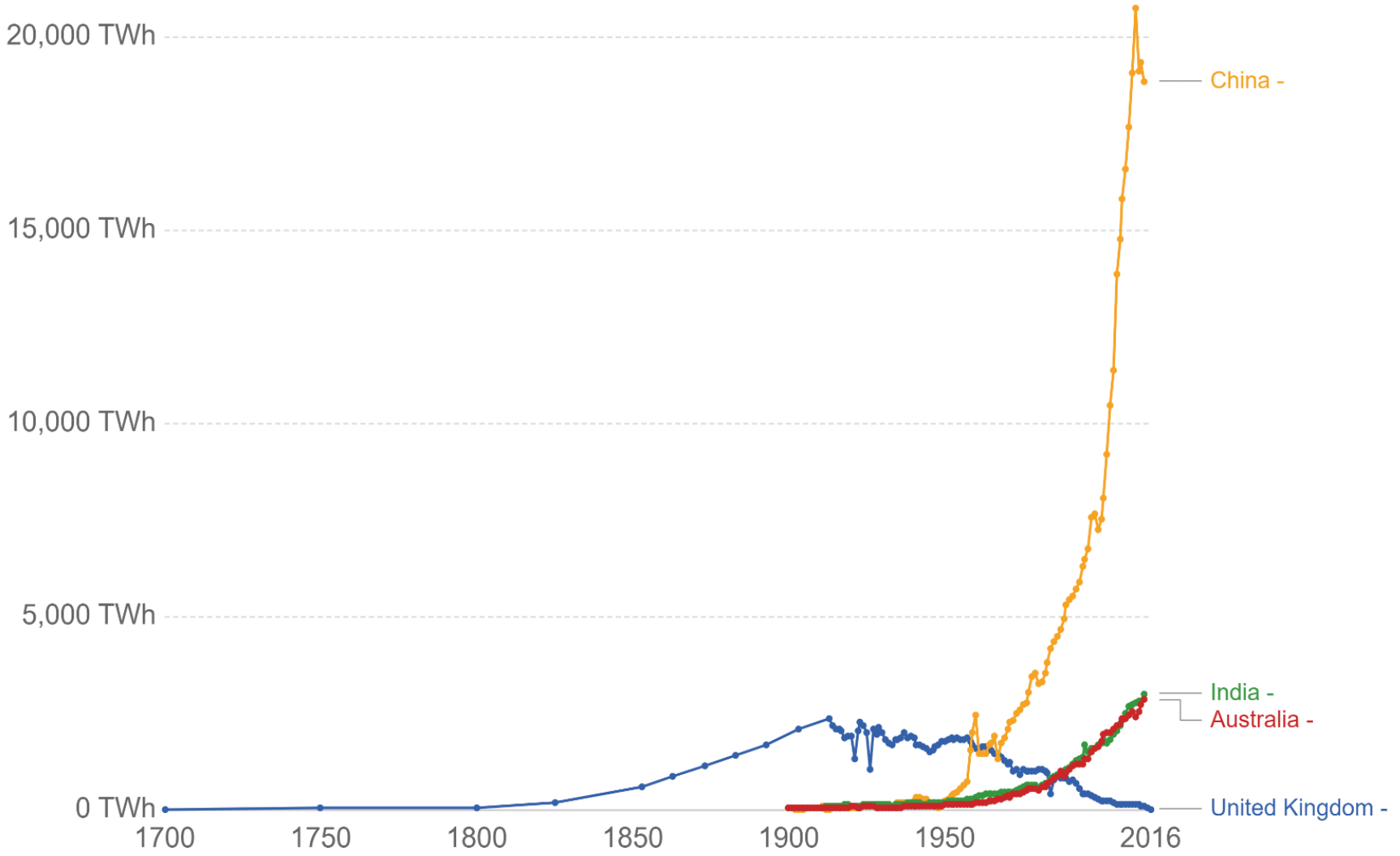
Coal production by country, terawatt-hours (TWh)

Annual coal production by country or region, measured in terawatt-hour (TWh) equivalents.

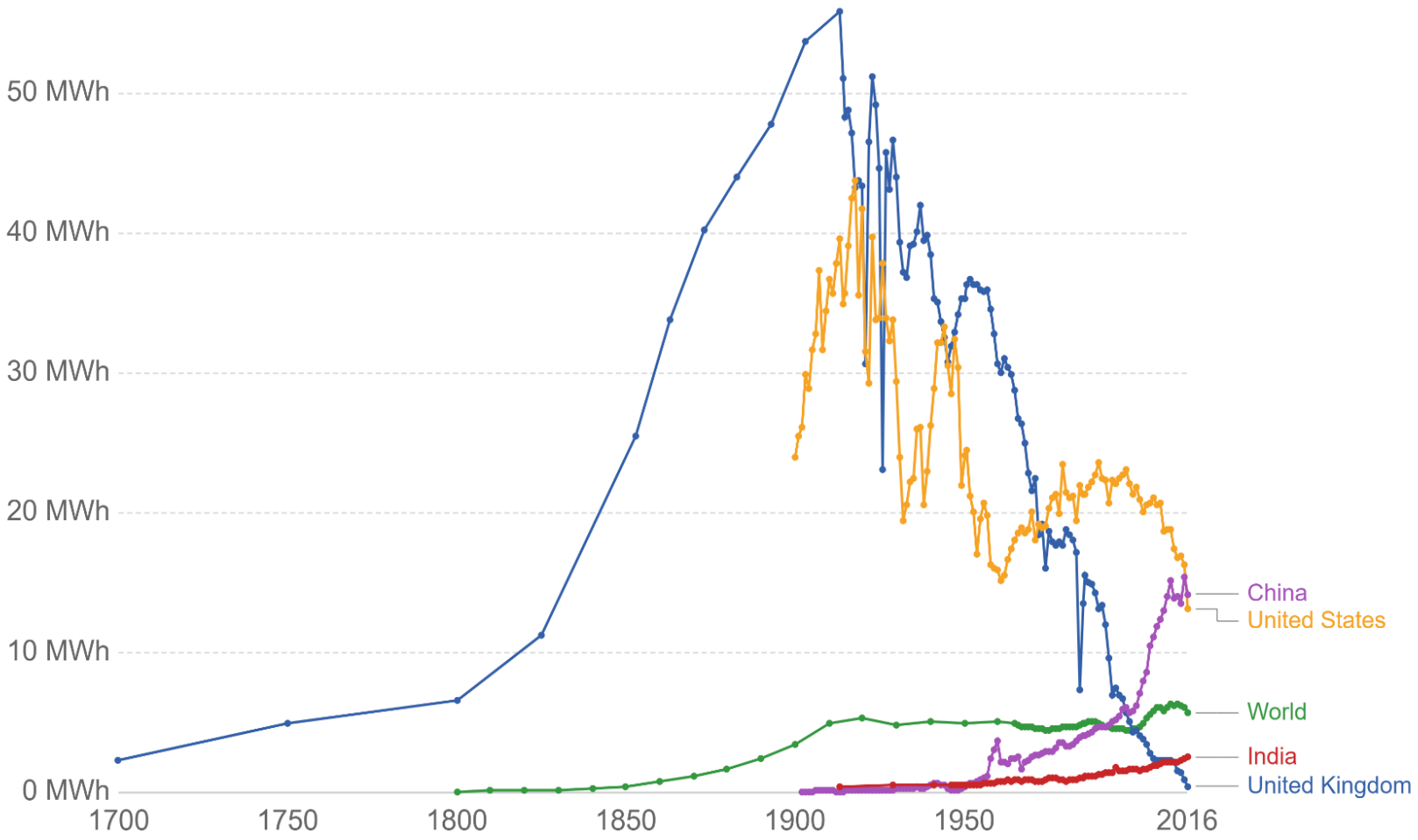


Source: Coal production - The SHIFT Project, Coal output and employment in UK - DECC (2016)

OurWorldInData.org/fossil-fuels/ • CC BY-SA

Coal production per capita over the long-term

Average coal production per capita over the long-term, measured in megawatt-hour (MWh) equivalents per person per year.

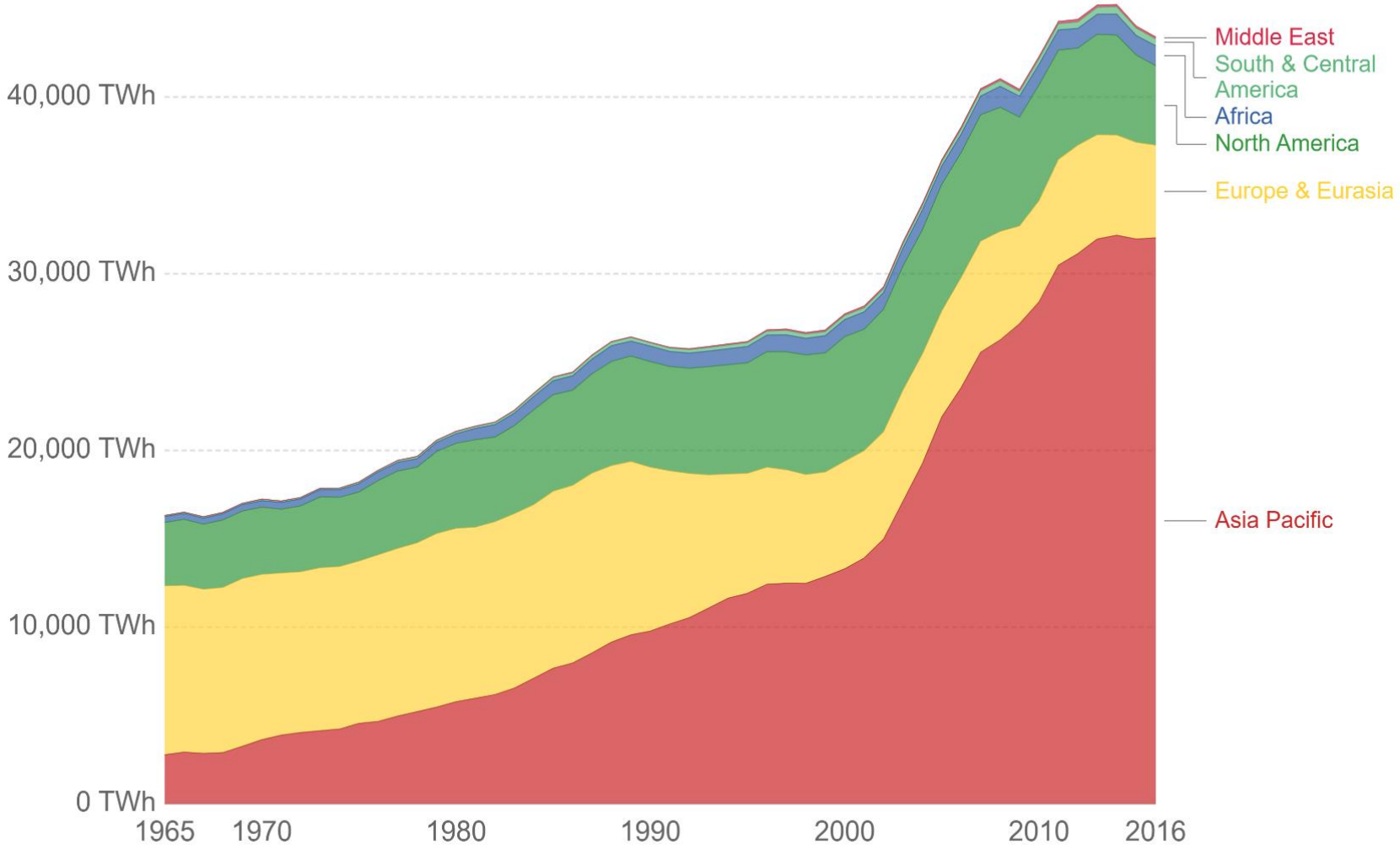


Source: Long-term per capita fossil fuels - OWID based on UN, Gapminder, BP, Etemad & Luciana

OurWorldInData.org/fossil-fuels/ • CC BY-SA

Coal consumption by region, terawatt-hours (TWh)

Annual coal consumption, measured in equivalents of terawatt-hours (TWh) per year.



Source: BP Statistical Review of Global Energy

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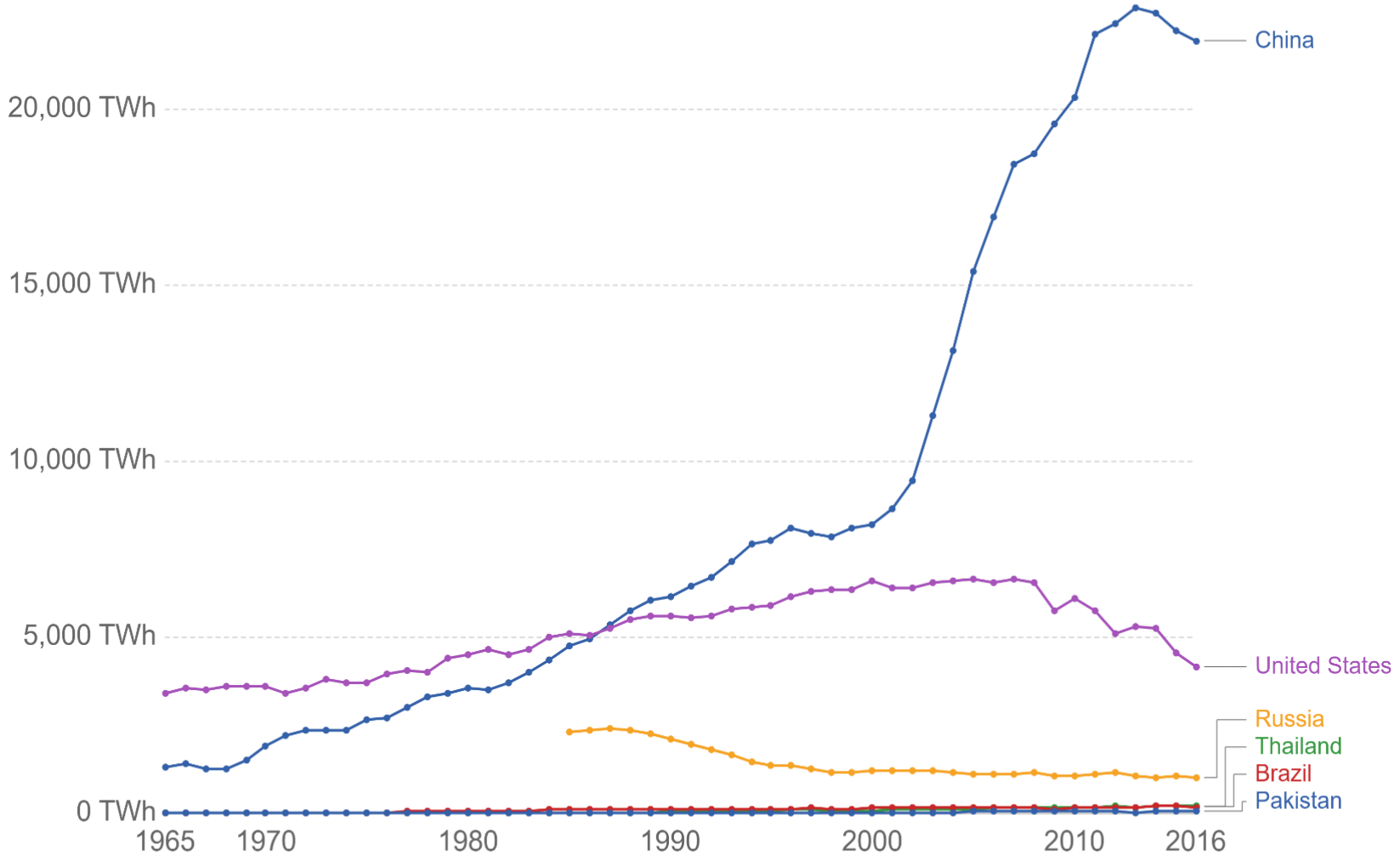
Coal consumption by country, terawatt-hours (TWh)

Coal consumption by country or region, measured in terawatt-hour (TWh) equivalents.



Source: BP Statistical Review of Global Energy

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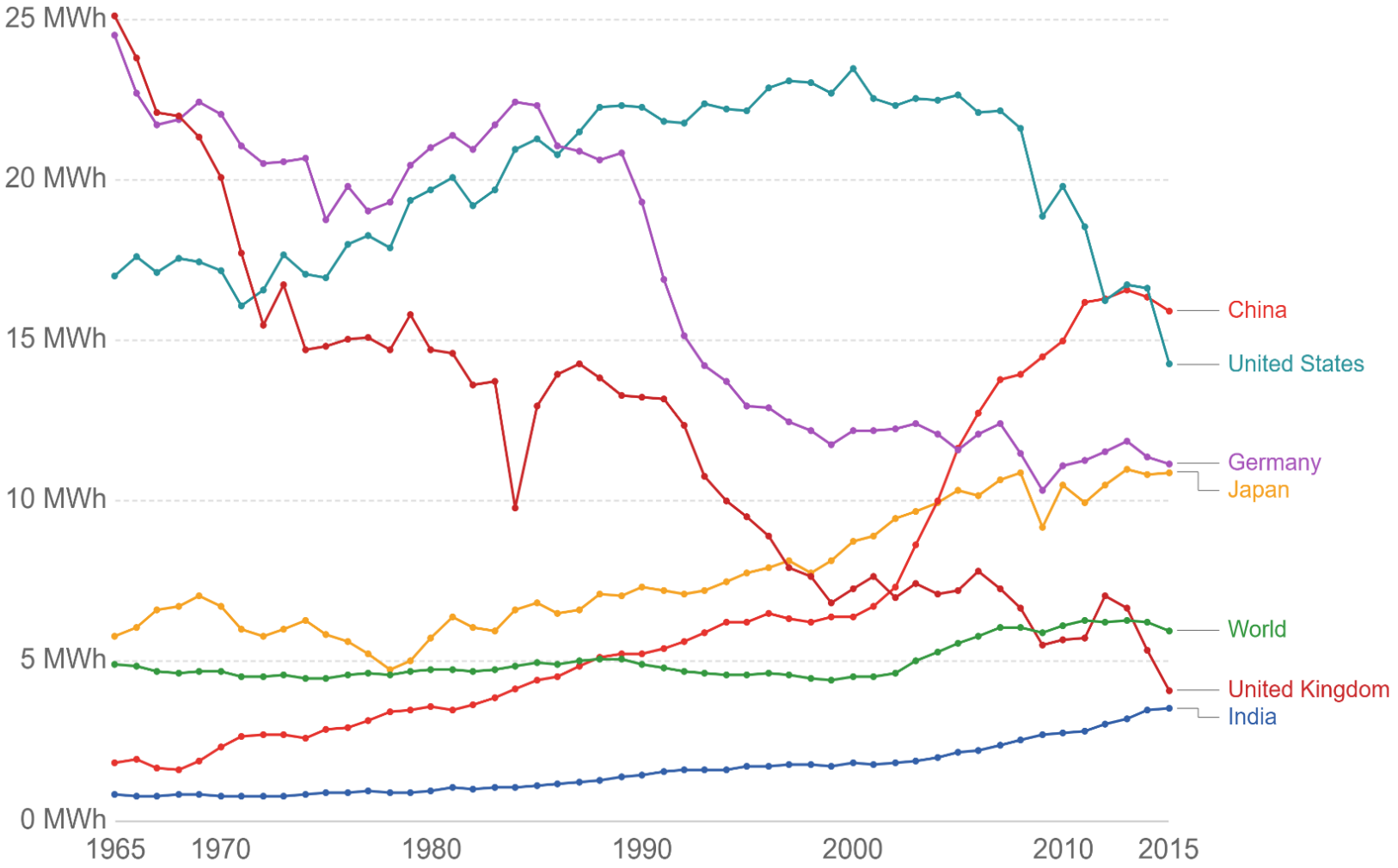
Coal consumption per capita, megawatt-hours per year

Average coal consumption per capita, measured in megawatt-hours (MWh) per person per year.

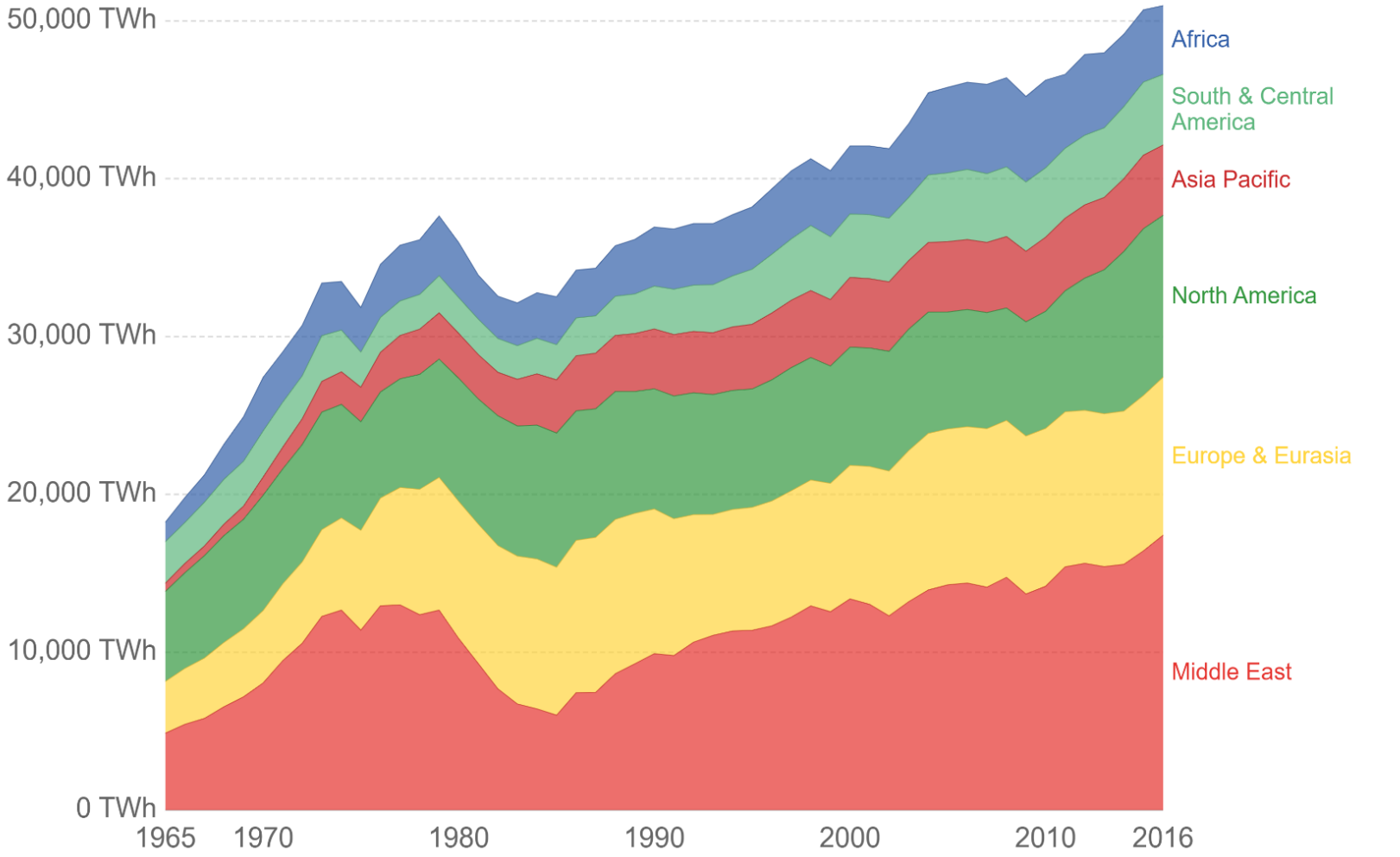


Source: Fossil fuel consumption per capita - BP & UN (2017 revision)

OurWorldInData.org/fossil-fuels/ • CC BY-SA

Oil production by region, terawatt-hours (TWh)

Annual oil production, measured in terawatt-hour (TWh) equivalents.



Source: BP Statistical Review of Global Energy

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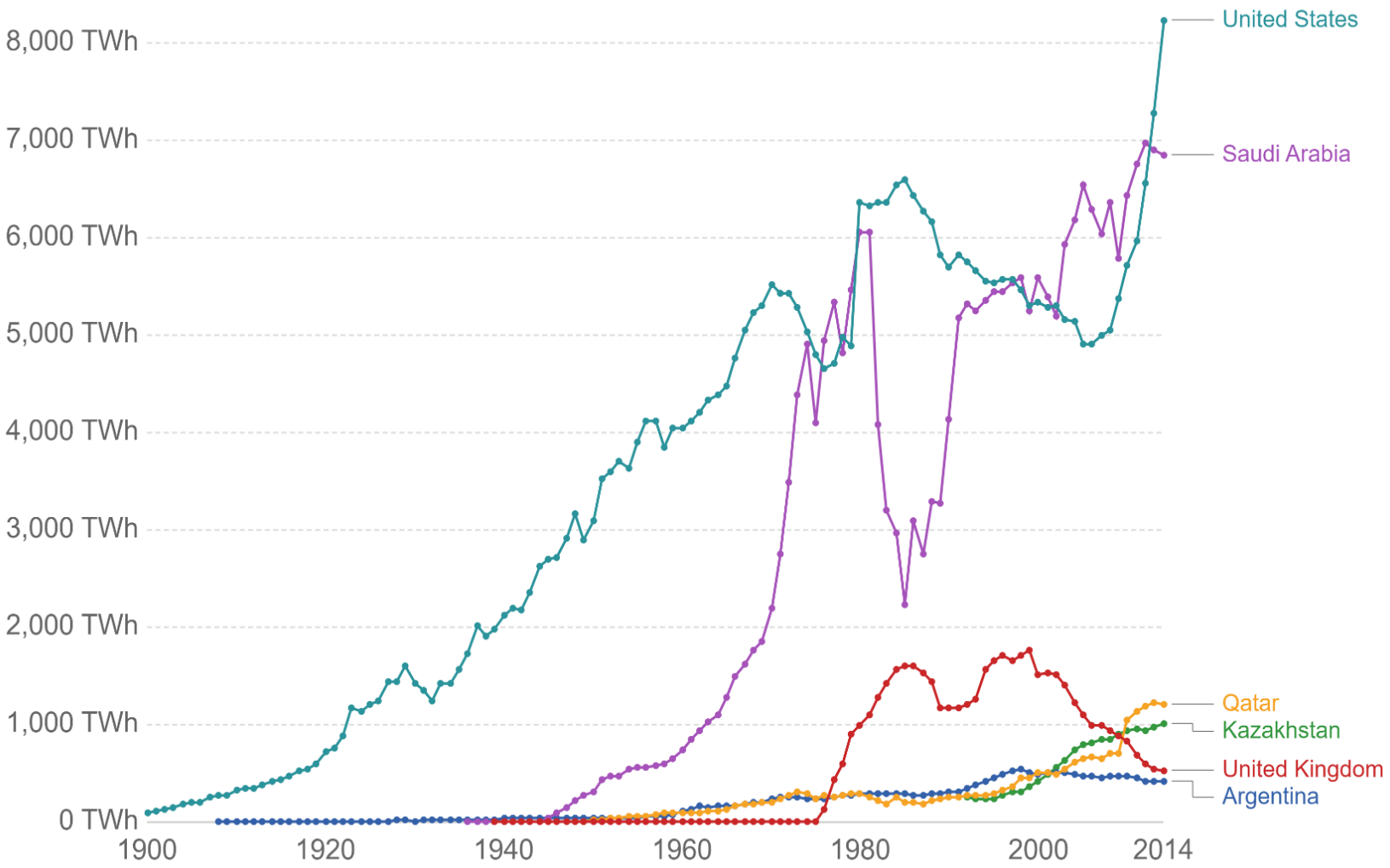
Oil production by country, terawatt-hours (TWh)

Oil production by country, measured in terawatt-hour (TWh) equivalents per year.

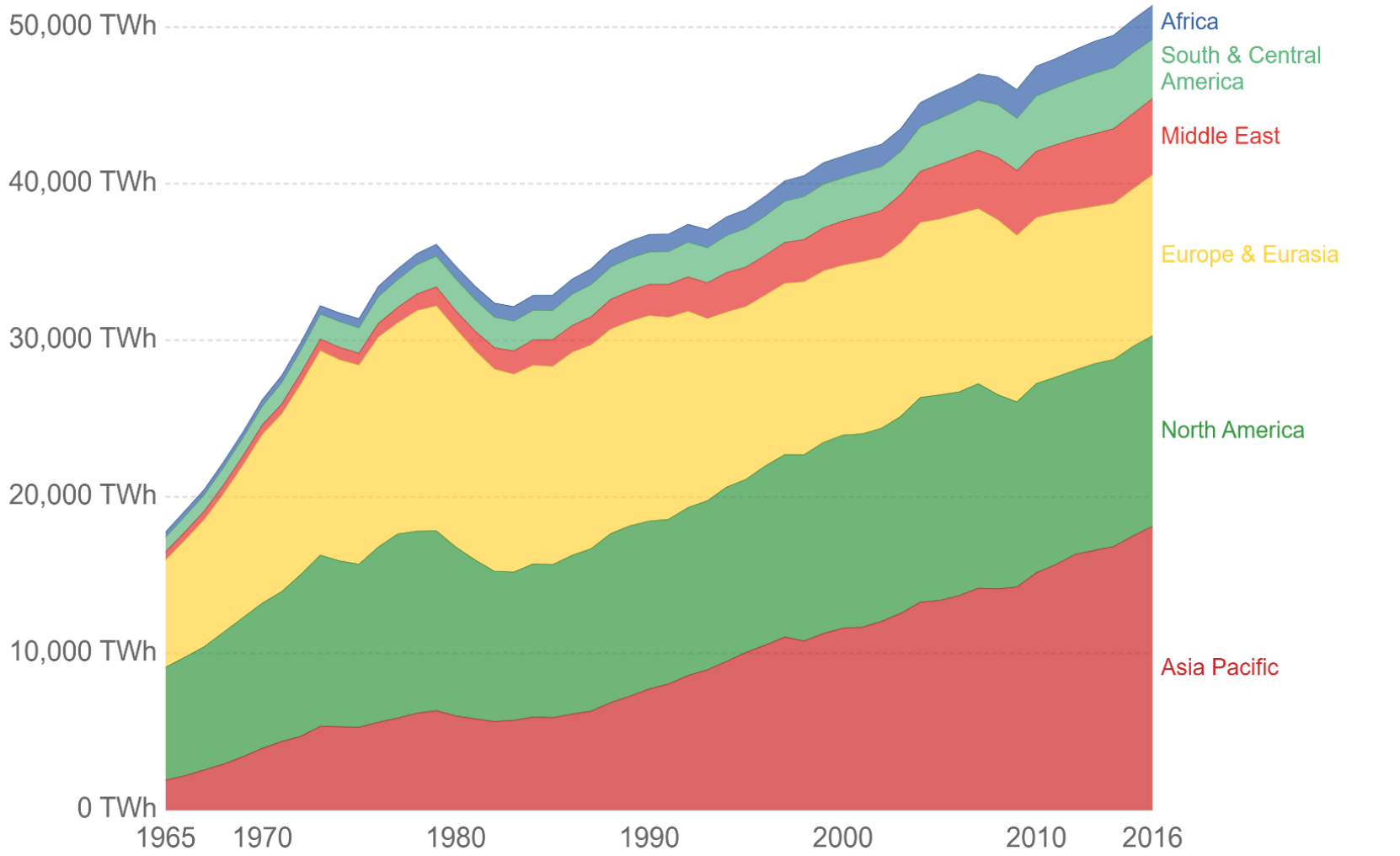


Source: The SHIFT Project - Etemad & Luciana; US IEA

OurWorldInData.org/fossil-fuels/ • CC BY-SA

Oil consumption by region, terawatt-hours (TWh)

Annual oil consumption, measured in terawatt-hour (TWh) equivalents.

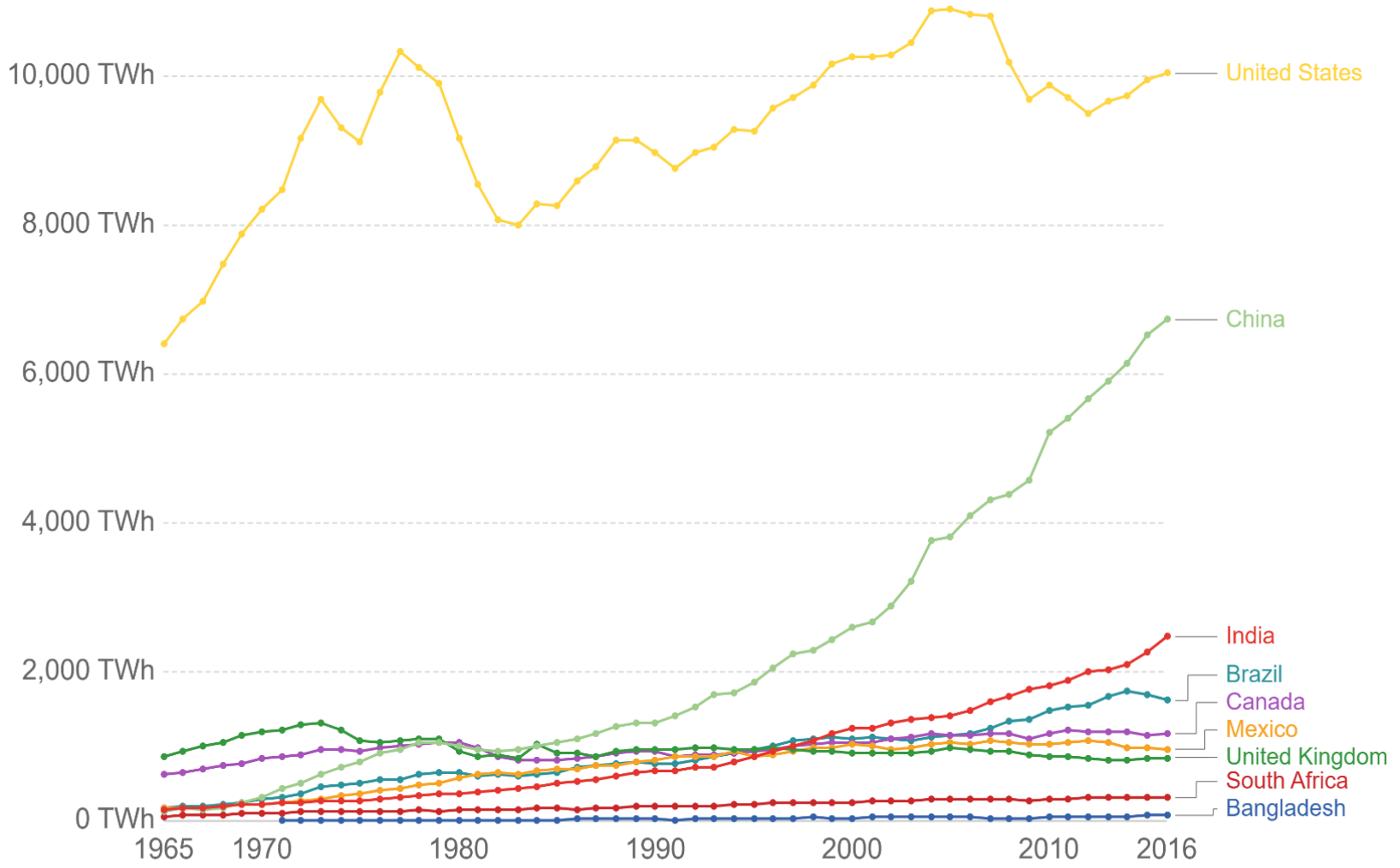


Source: BP Statistical Review of Global Energy

OurWorldInData.org/fossil-fuels/ • CC BY-SA

Oil consumption by country, terawatt-hours (TWh)

Oil consumption by country, measured in terawatt-hour (TWh) equivalents per year.

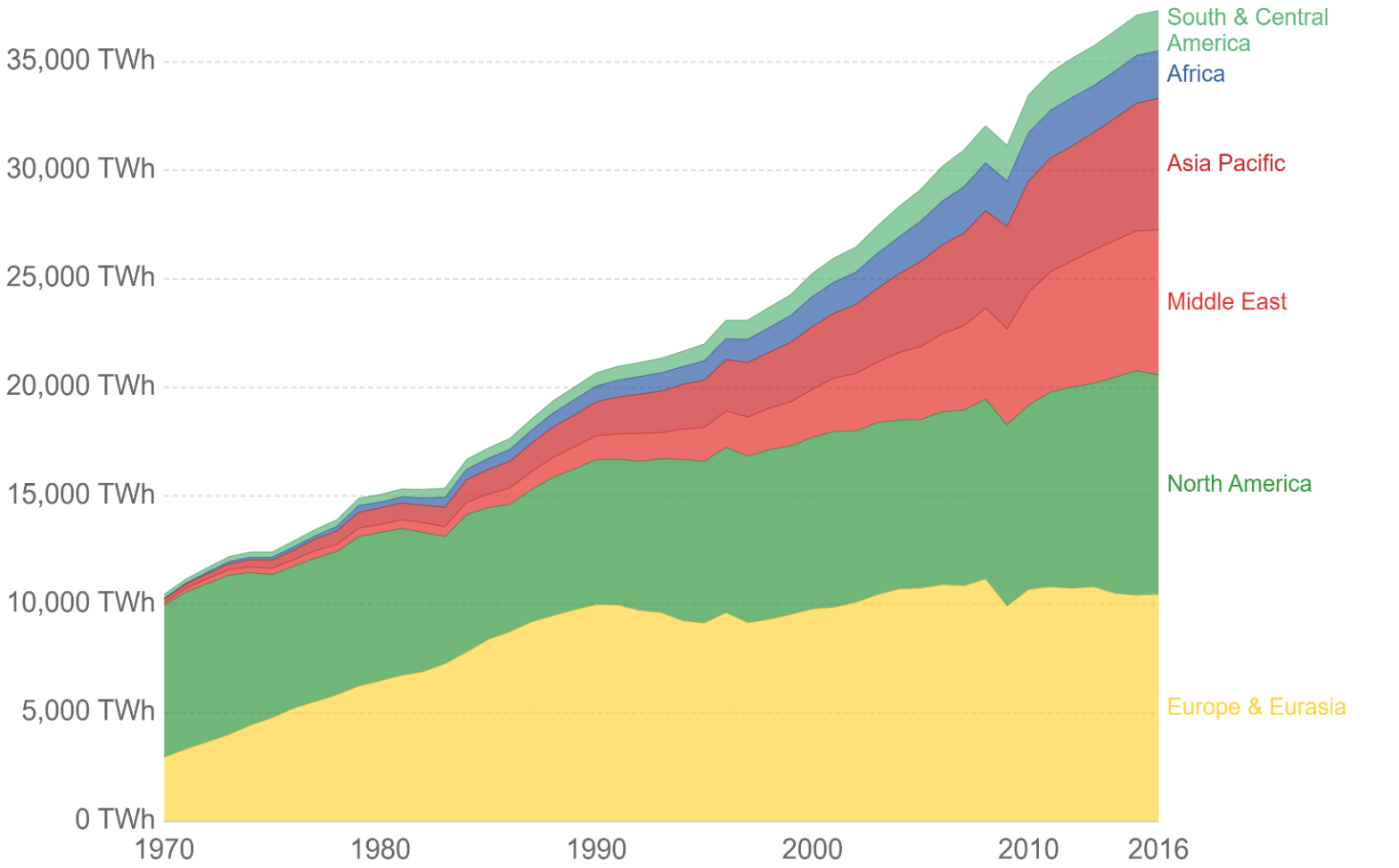


Source: BP Statistical Review of Global Energy

OurWorldInData.org/fossil-fuels/ • CC BY-SA

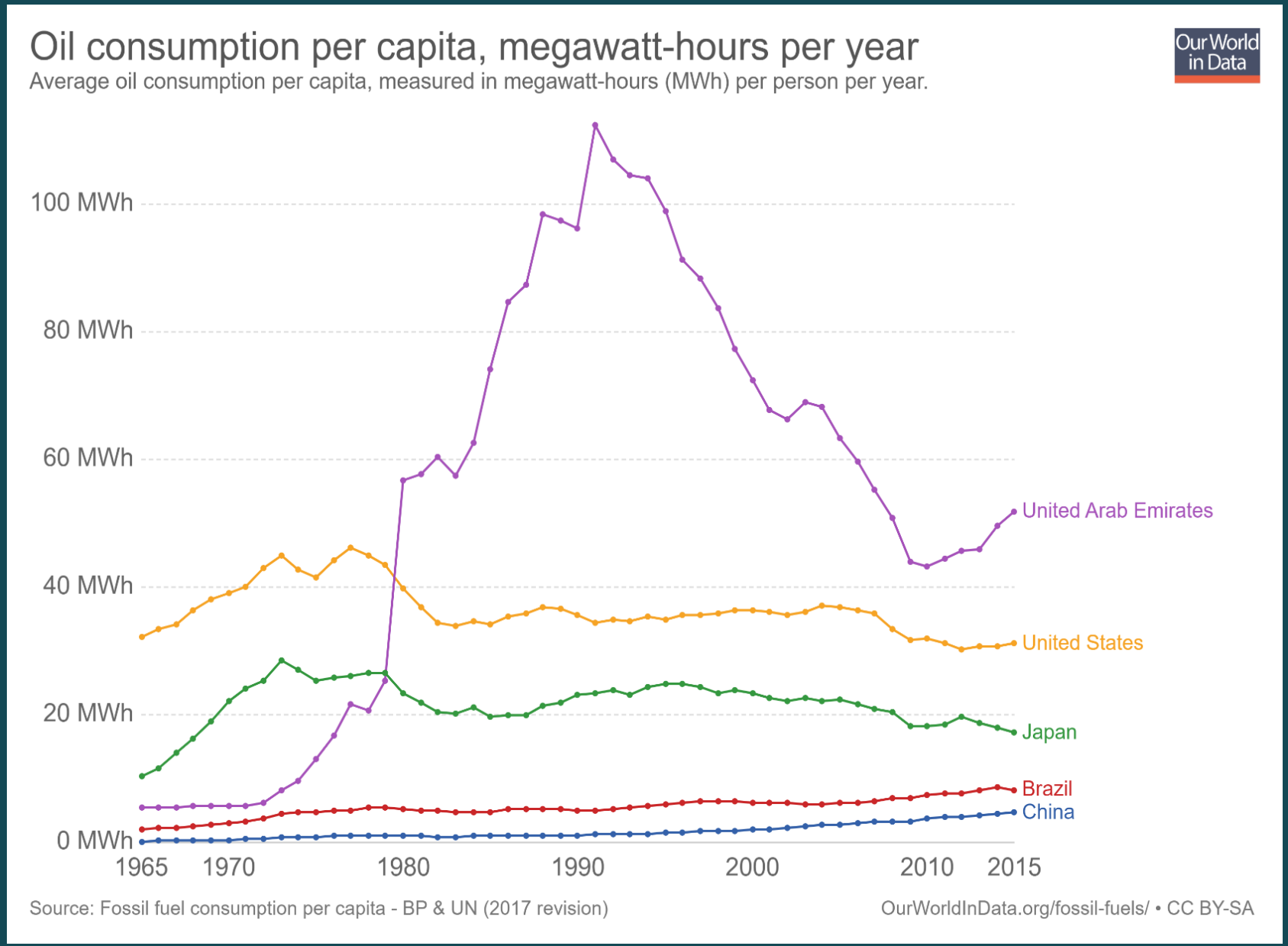
Natural gas production by region, terawatt-hours (TWh)

Annual natural gas production, measured in terawatt-hour (TWh) equivalents.



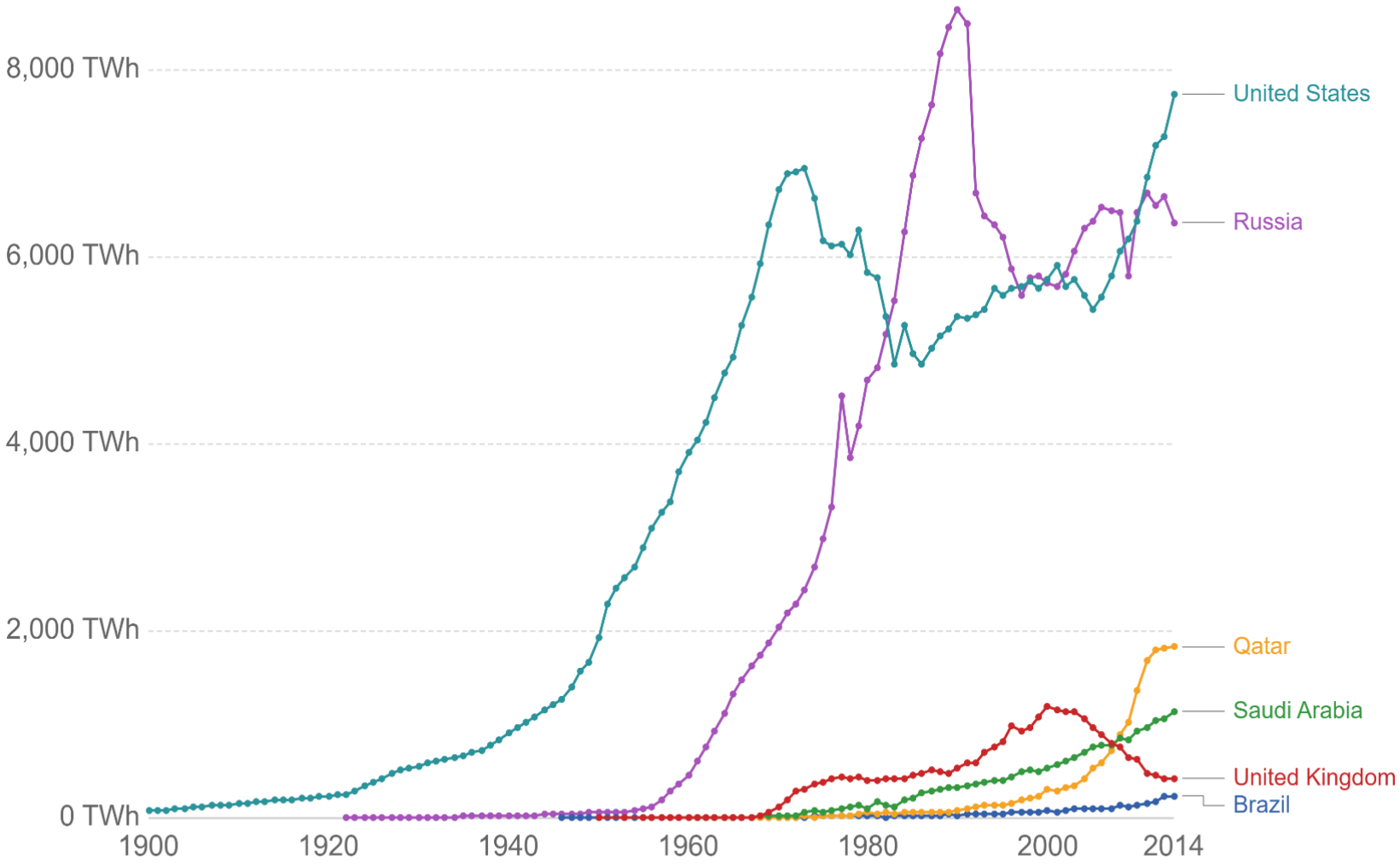
Source: BP Statistical Review of Global Energy

OurWorldInData.org/fossil-fuels/ • CC BY-SA


Oil consumption per capita, megawatt-hours per year
Average oil consumption per capita, measured in megawatt-hours (MWh) per person per year.
Our World in Data
100 MWh
80 MWh
60 MWh
40 MWh
20 MWh
0 MWh
1965
1970
1980
1990
2000
2010
2015
United Arab Emirates
United States
Japan
Brazil
China
Source: Fossil fuel consumption per capita - BP & UN (2017 revision)
OurWorldInData.org/fossil-fuels/ • CC BY-SA

Gas production by country, terawatt-hours (TWh)

Natural gas production, measured in terawatt-hour (TWh) equivalents per year.

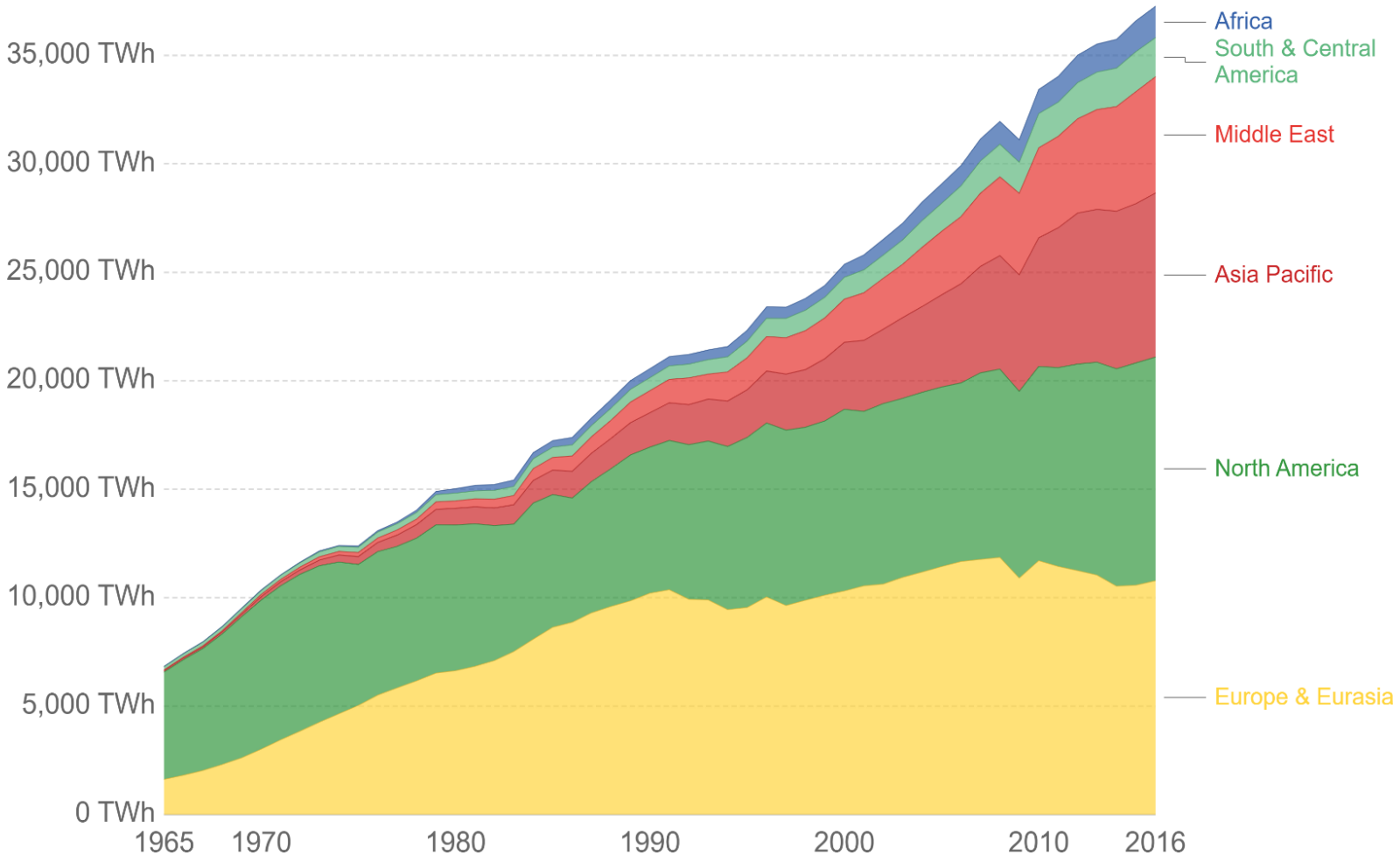


Source: The SHIFT Project - Etemad & Luciana; US IEA

OurWorldInData.org/fossil-fuels/ • CC BY-SA

Natural gas consumption by region, terawatt-hours (TWh)

Annual natural gas consumption, measured in terawatt-hour (TWh) equivalents.



Source: BP Statistical Review of Global Energy

OurWorldInData.org/fossil-fuels/ • CC BY-SA

Gas consumption by country, terawatt-hours (TWh), 2016

Natural gas consumption by country, measured in terawatt-hour (TWh) equivalents per year.

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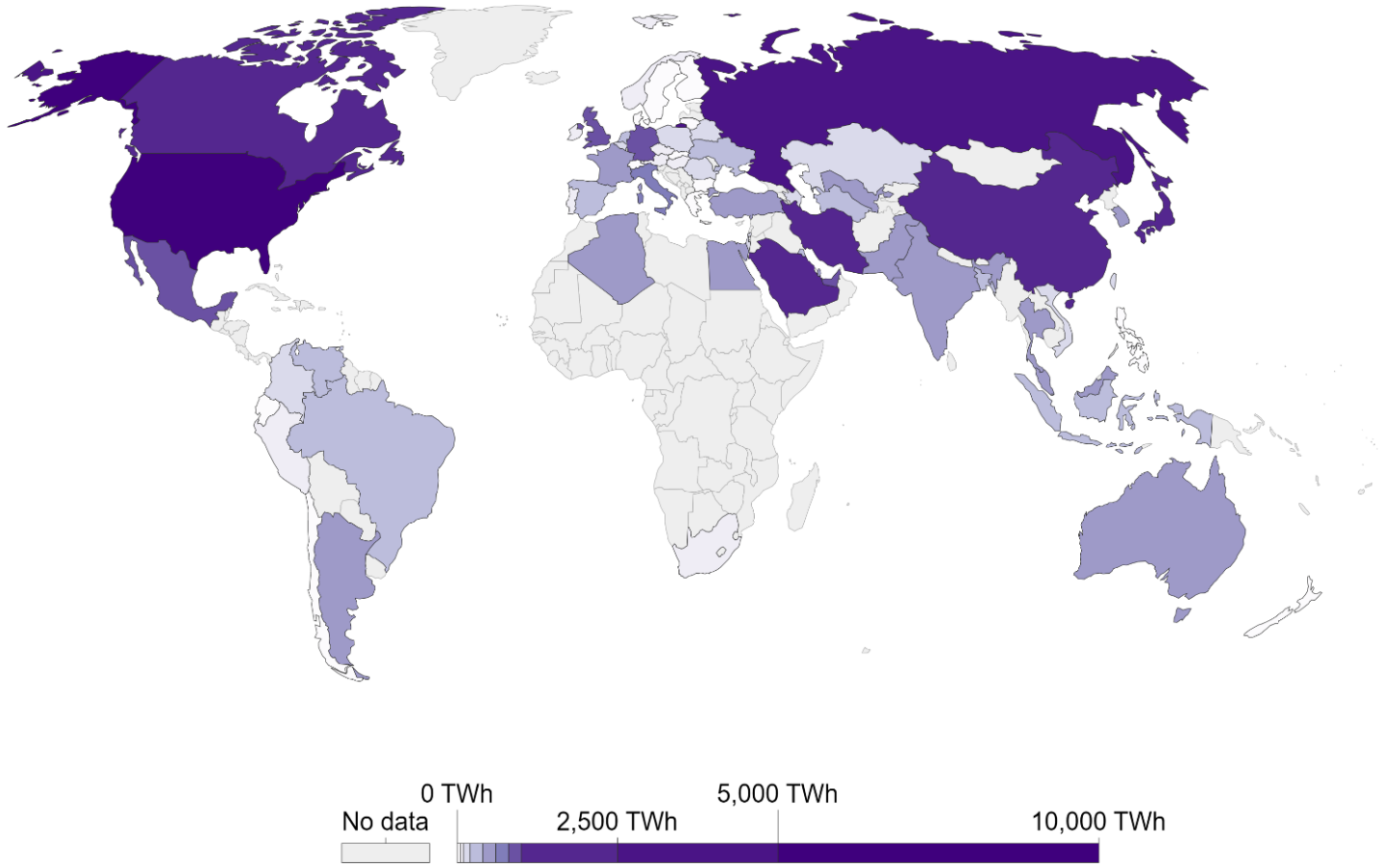
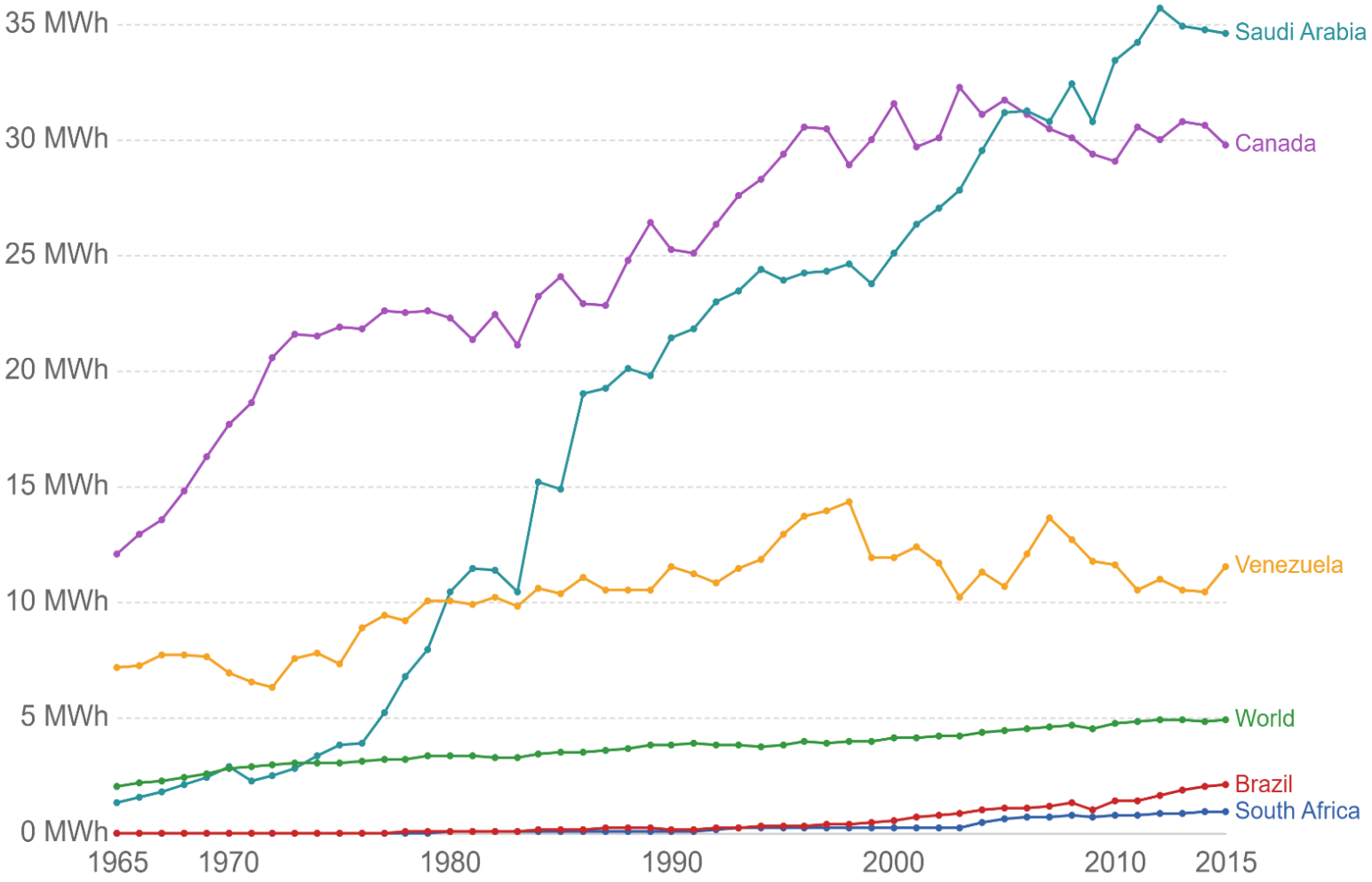


Source: BP Statistical Review of Global Energy

OurWorldInData.org/fossil-fuels/ • CC BY-SA

Natural gas consumption per capita, megawatt-hours per year

Average natural gas consumption per capita, measured in megawatt-hours (MWh) per person per year.



Source: Fossil fuel consumption per capita - BP & UN (2017 revision)

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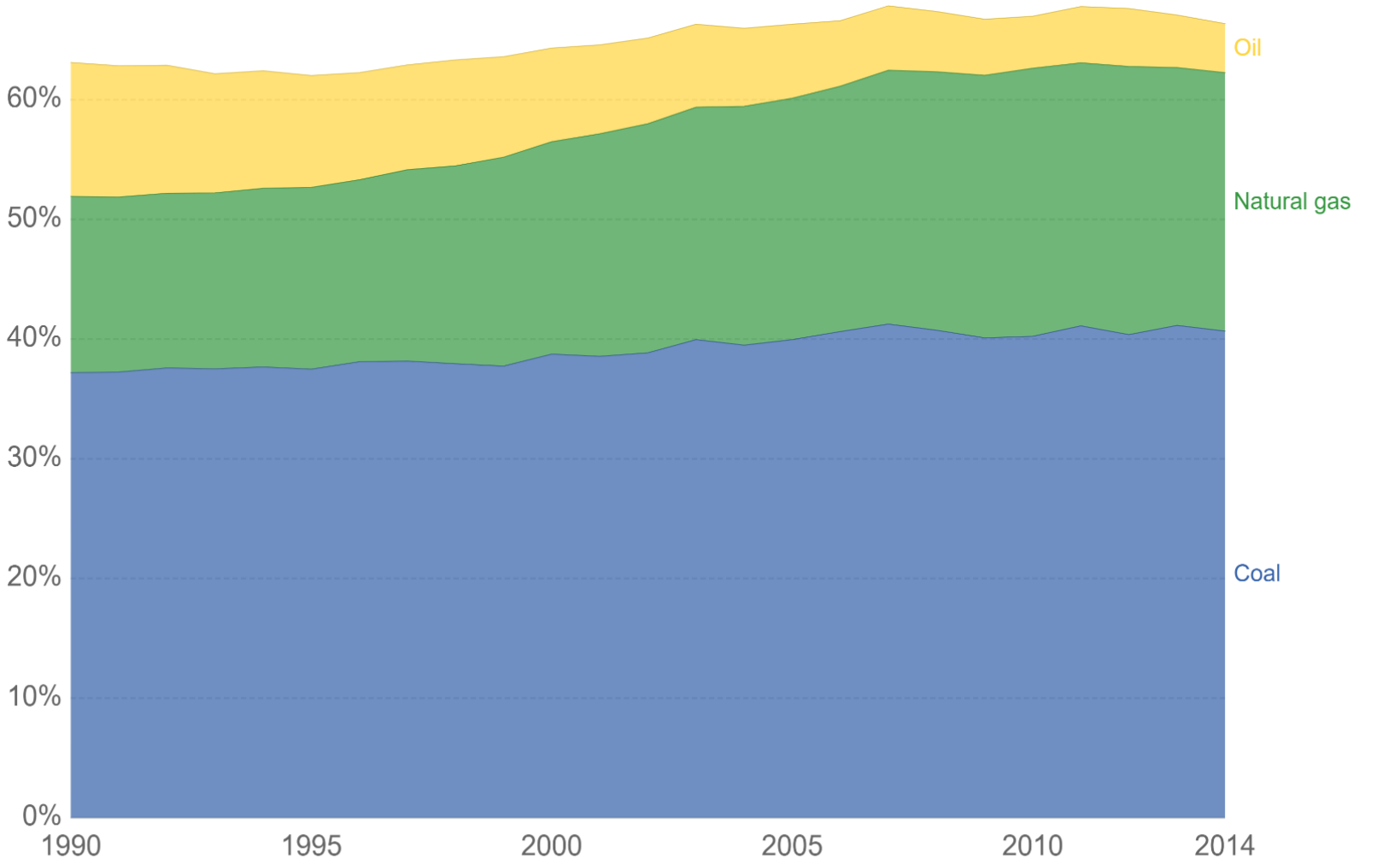
Share of electricity production from fossil fuels, World

The share of total electricity production from coal, oil and natural gas sources.



Source: International Energy Agency (IEA) via The World Bank

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Coal Proved Reserves, 2015

Total proved coal reserves, measured in million tonnes. Proved reserves is 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.

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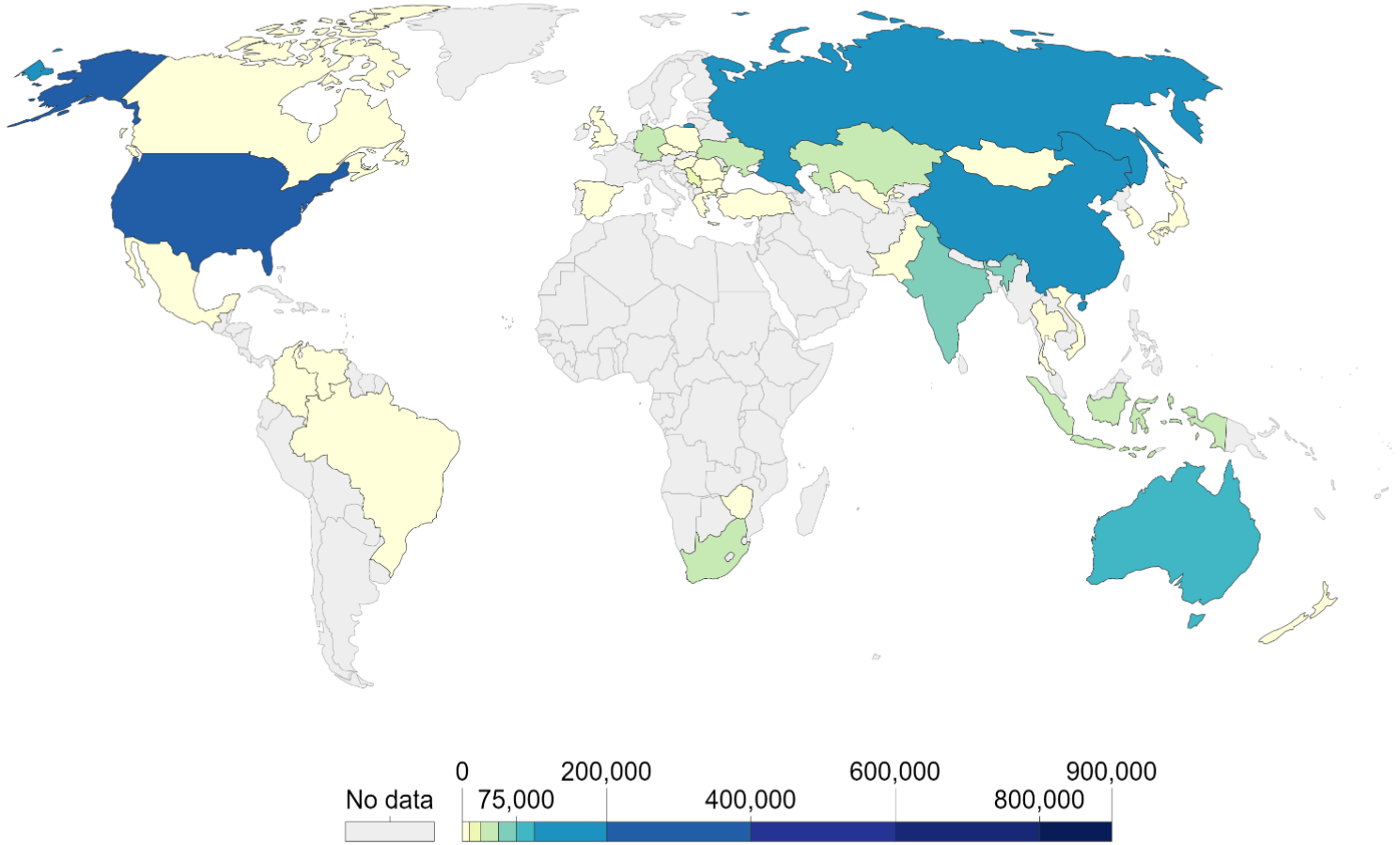


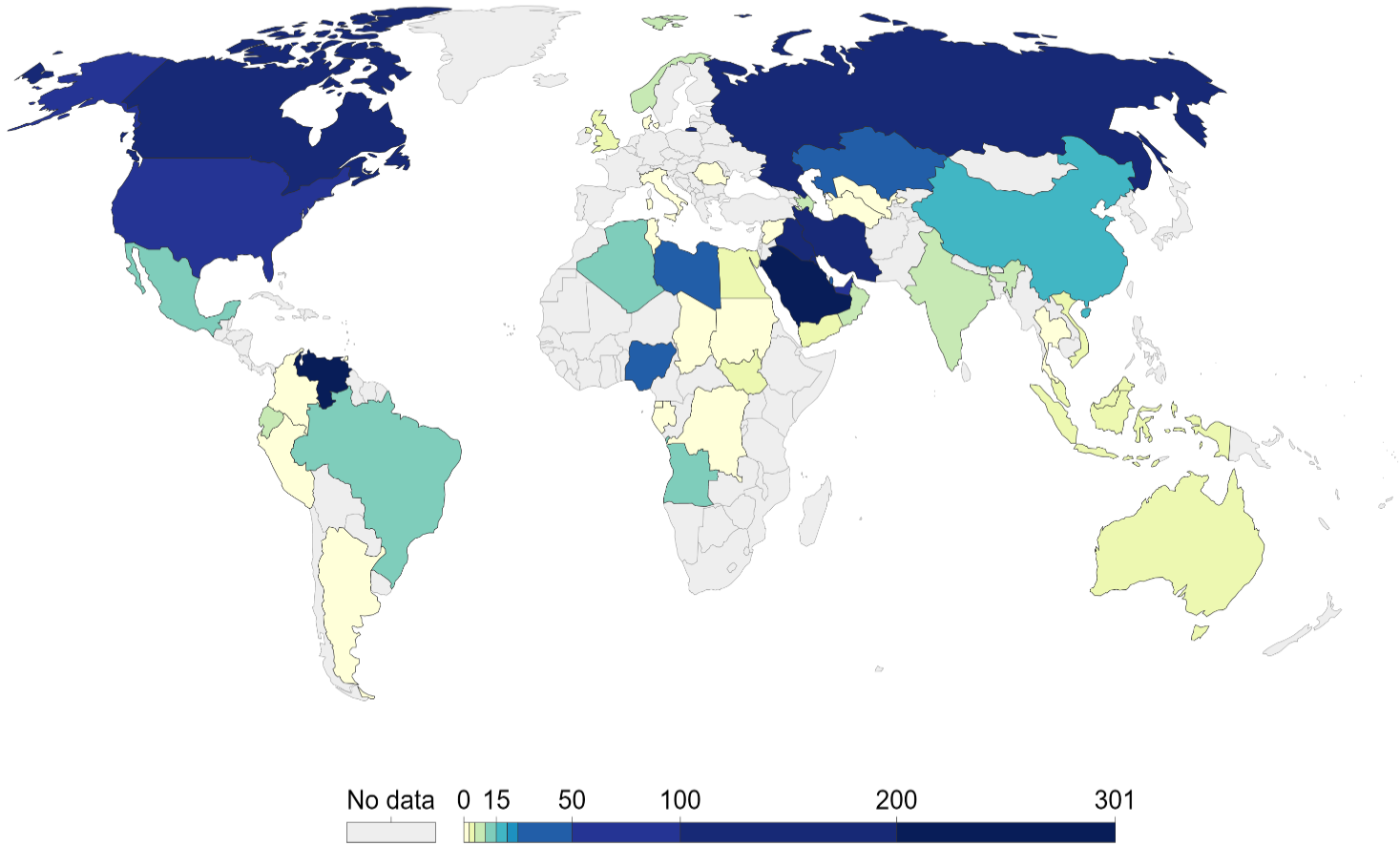
Source: BP Statistical Review

OurWorldInData.org/fossil-fuels/ • CC BY-SA

Oil Proved Reserves, 2015

Total proved oil reserves, measured in thousand million barrels. Proved reserves is 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.

Our World in Data



Source: BP Statistical Review

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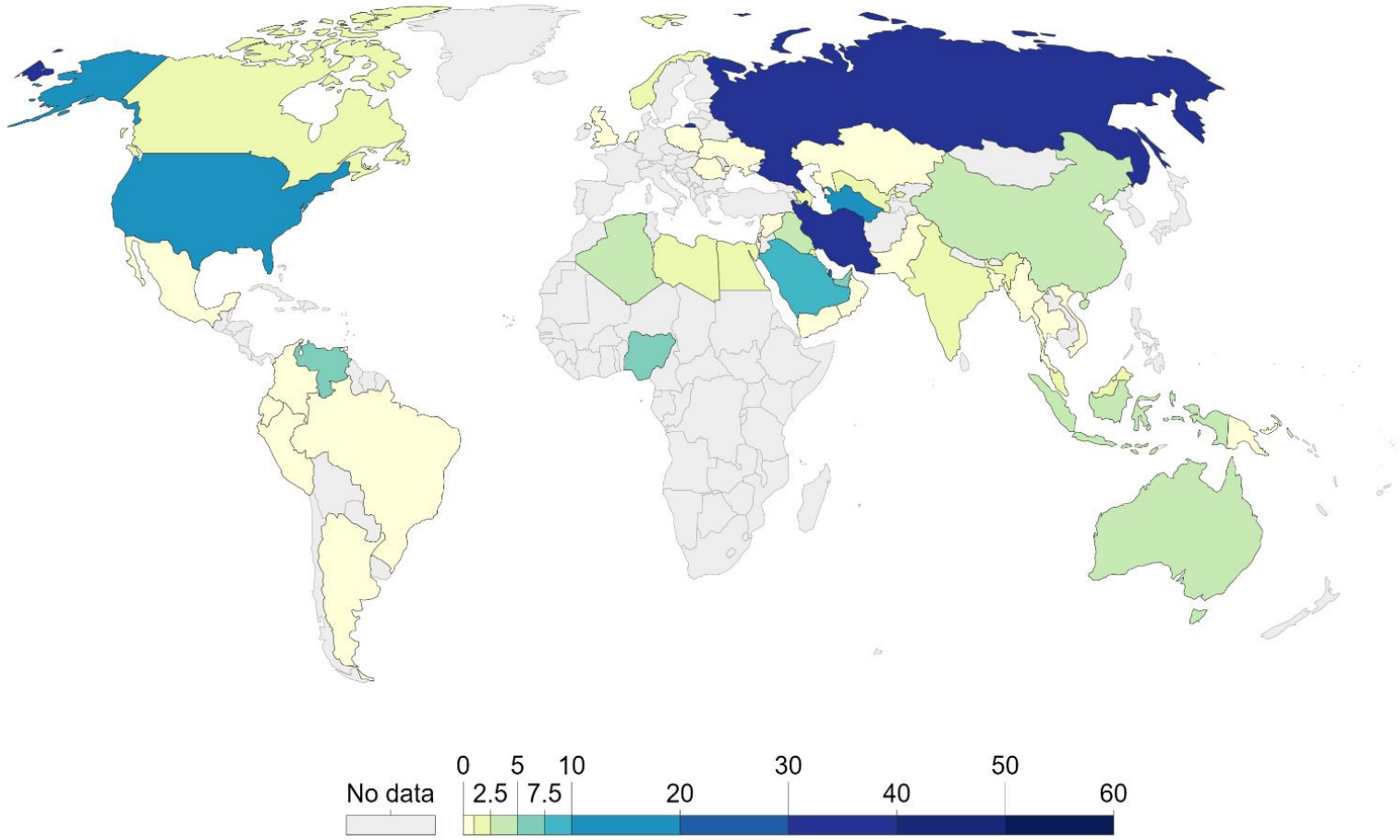
Natural Gas Proved Reserves, 2015

Total proved gas reserves, measured in trillion cubic metres. Proved reserves is 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.



Source: BP Statistical Review

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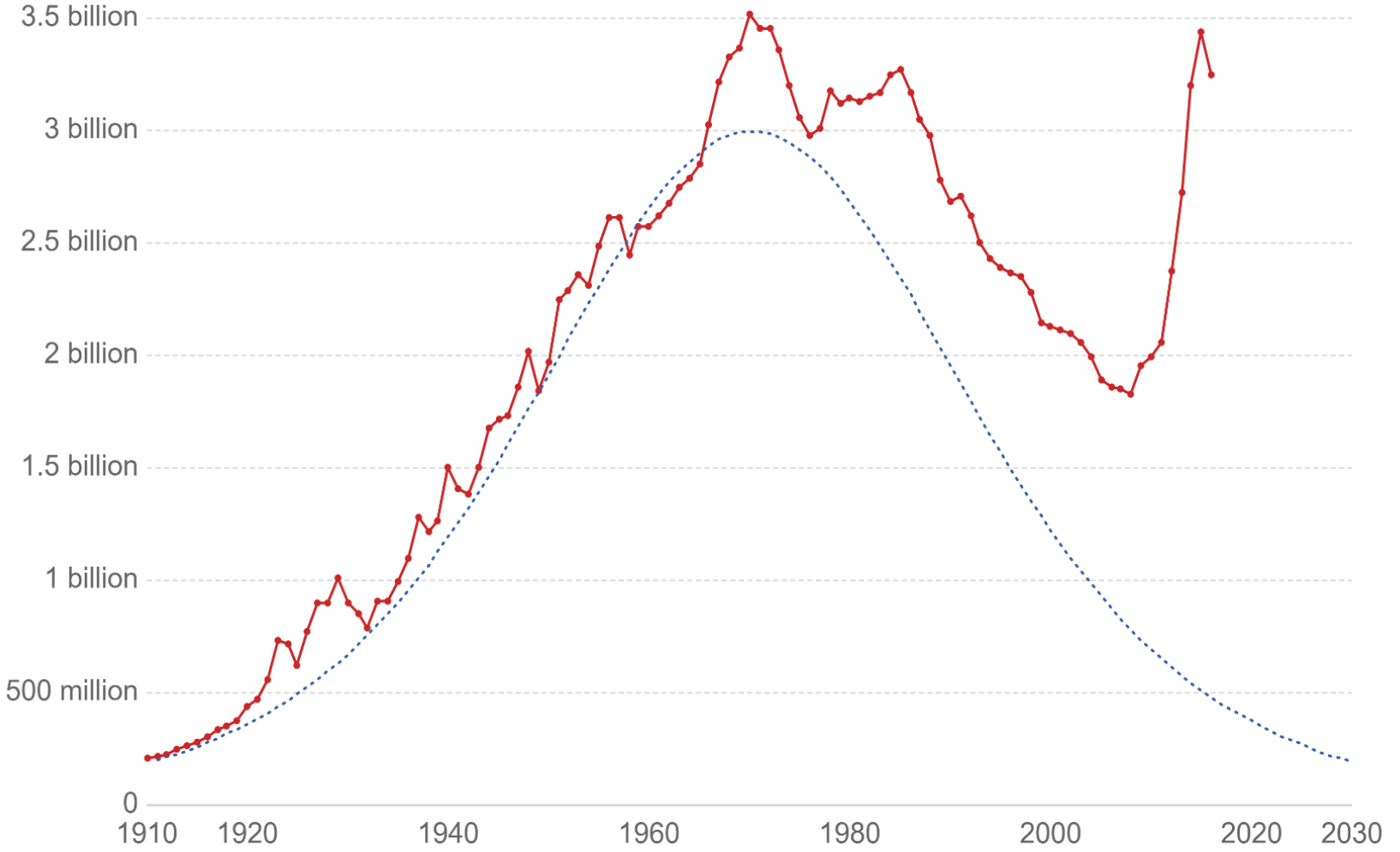
Hubbert's peak vs. actual oil production in the United States

Hubbert's hypothesis of peak oil production in the United States, alongside actual oil production trends in the United States, both measured in barrels per year.



Source: Cavallo (2004) & EIA

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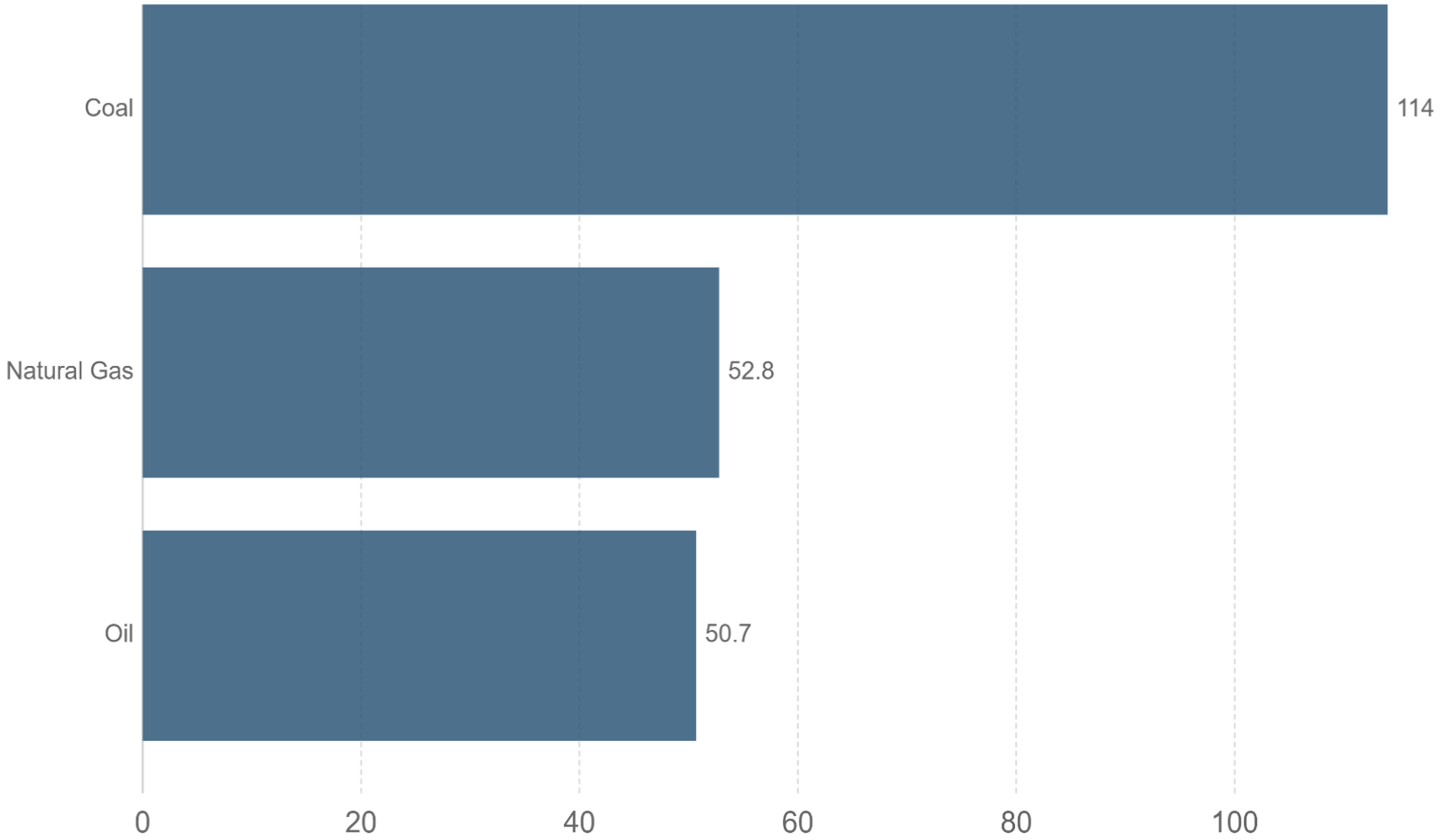
Years of fossil fuel reserves left

Years of global coal, oil and natural gas left, reported as the reserves-to-product (R/P) ratio which measures the number of years of production left based on known reserves and annual production levels in 2015. Note that these values can change with time based on the discovery of new reserves, and changes in annual production



Source: BP Statistical Review of World Energy 2016

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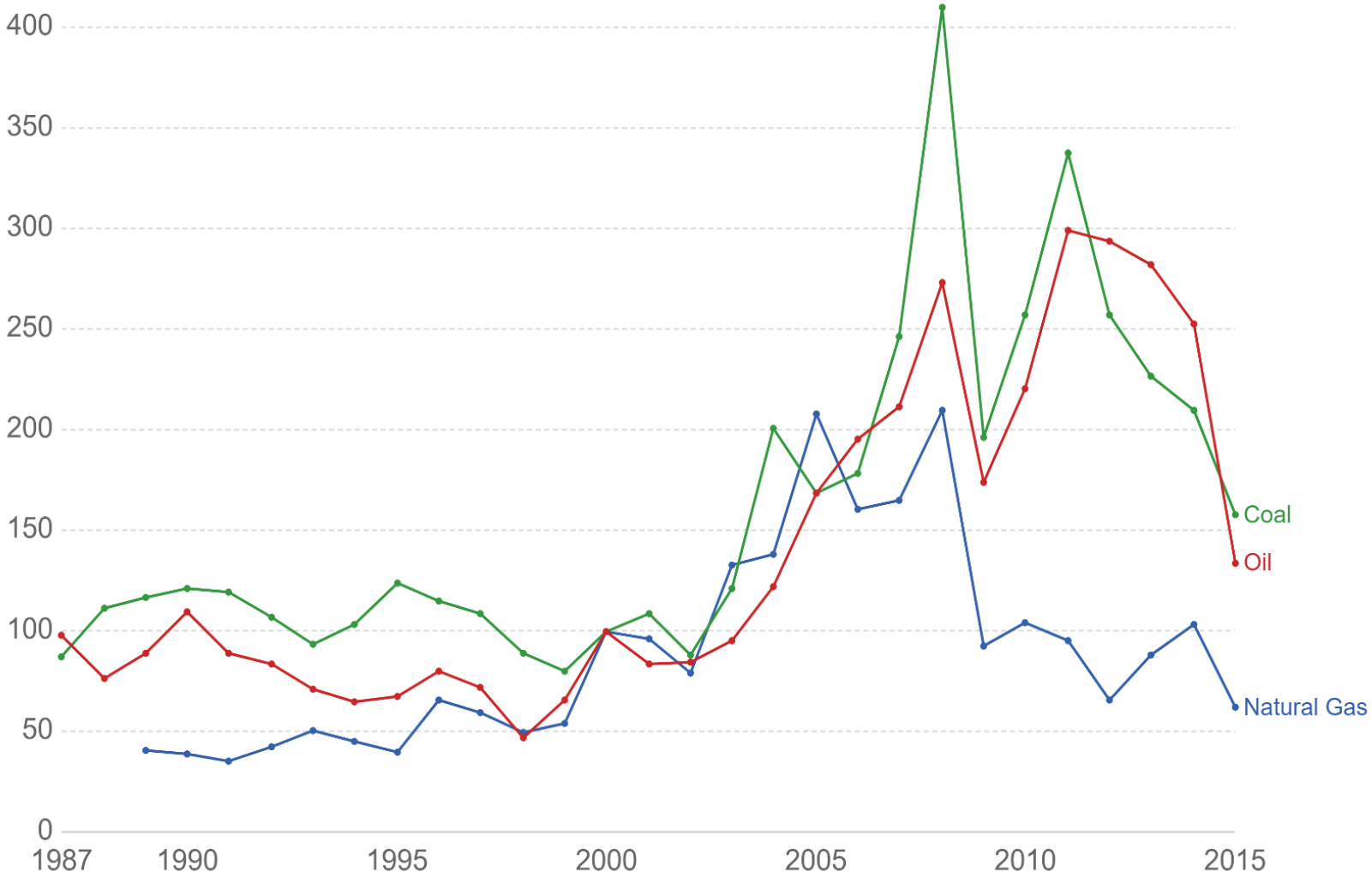
Fossil fuel price index

Average global prices of oil, natural gas and coal, measured as an energy index where prices in 2000=100.



Source: BP Statistical Review 2016

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Crude oil prices over the long term, US$ per barrel

Global crude oil prices, measured in 2016 US dollars per barrel.

Source: BP Statistical Review 2016

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Crude oil spot prices, US$ per MWh

Crude oil spot price of the most common oil blends, measured in 2016 US dollars per megawatt-hour (MWh) equivalents.

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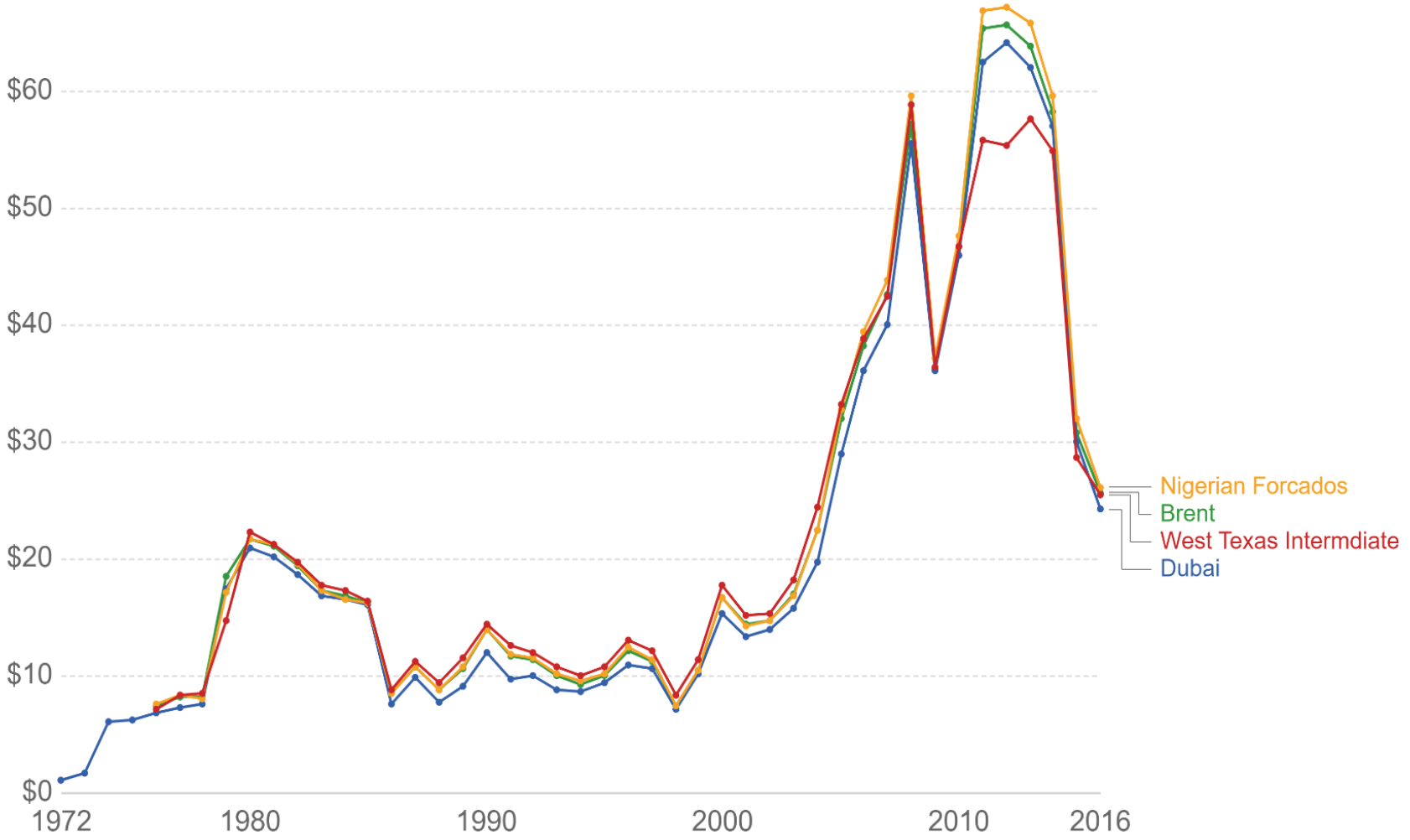

Source: BP Statistical Review of Global Energy

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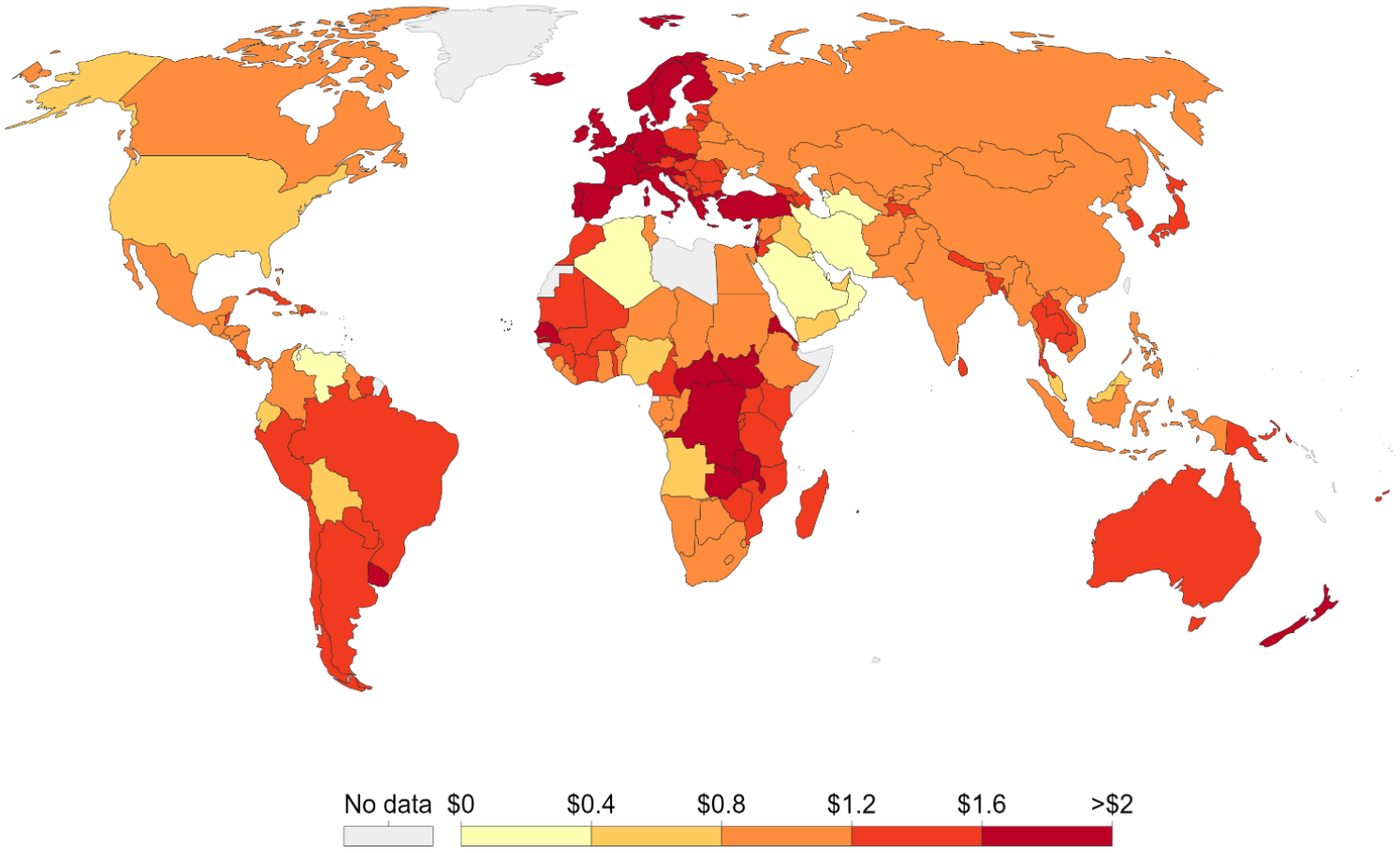
Pump price for gasoline (US$ per liter), 2014

Fuel prices refer to the pump prices of the most widely sold grade of gasoline. Prices have been converted from the local currency to U.S. dollars.

Our World in Data



Source: World Bank – WDI

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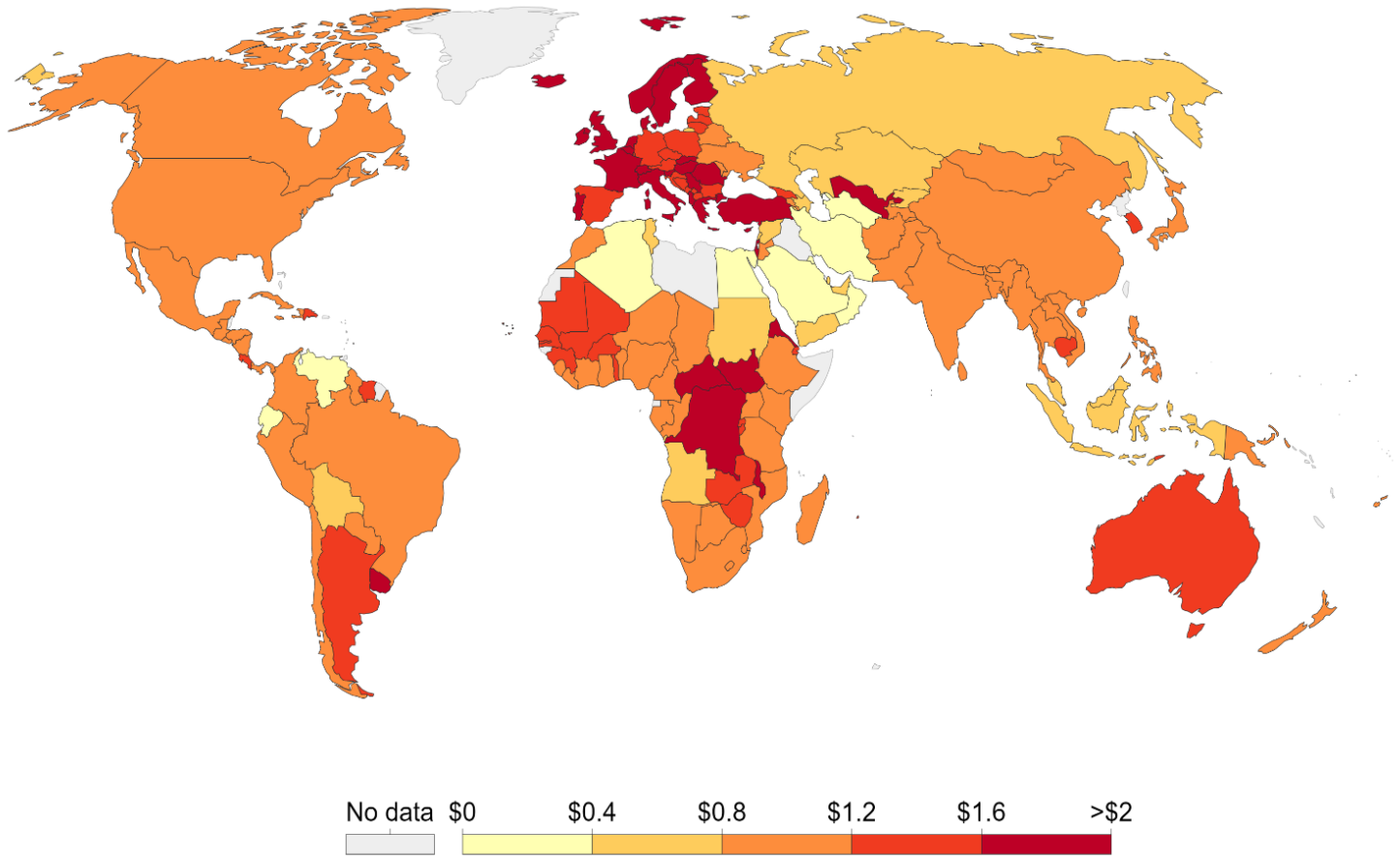
Pump price for diesel fuel (US$ per liter), 2014

Fuel prices refer to the pump prices of the most widely sold grade of diesel fuel. Prices have been converted from the local currency to U.S. dollars.

Our World in Data



Source: World Bank – WDI

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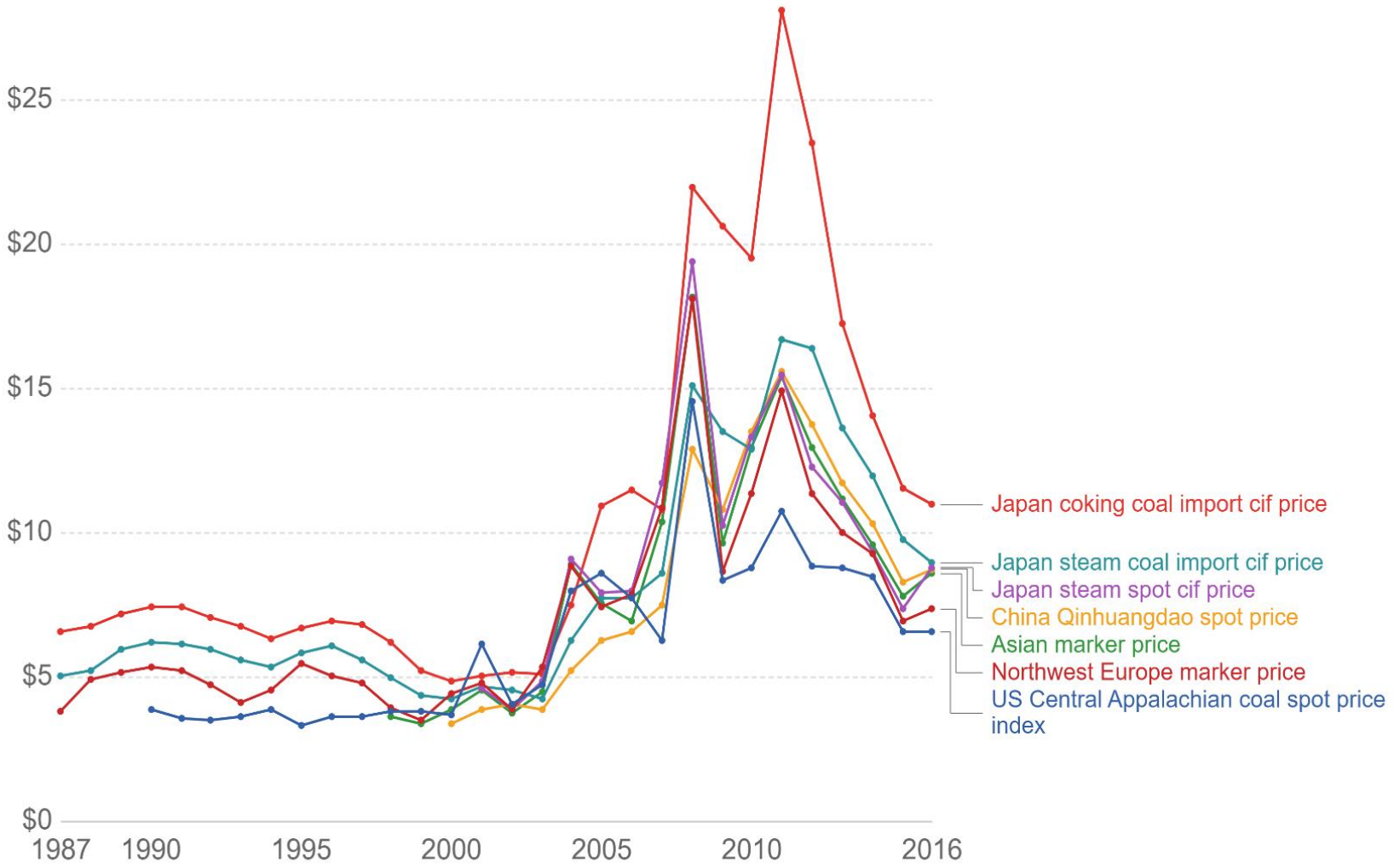
Coal prices, US$ per MWh

Coal prices of various production locations, measured in 2016 US dollars per megawatt-hour (MWh).



Source: BP Statistical Review of Global Energy

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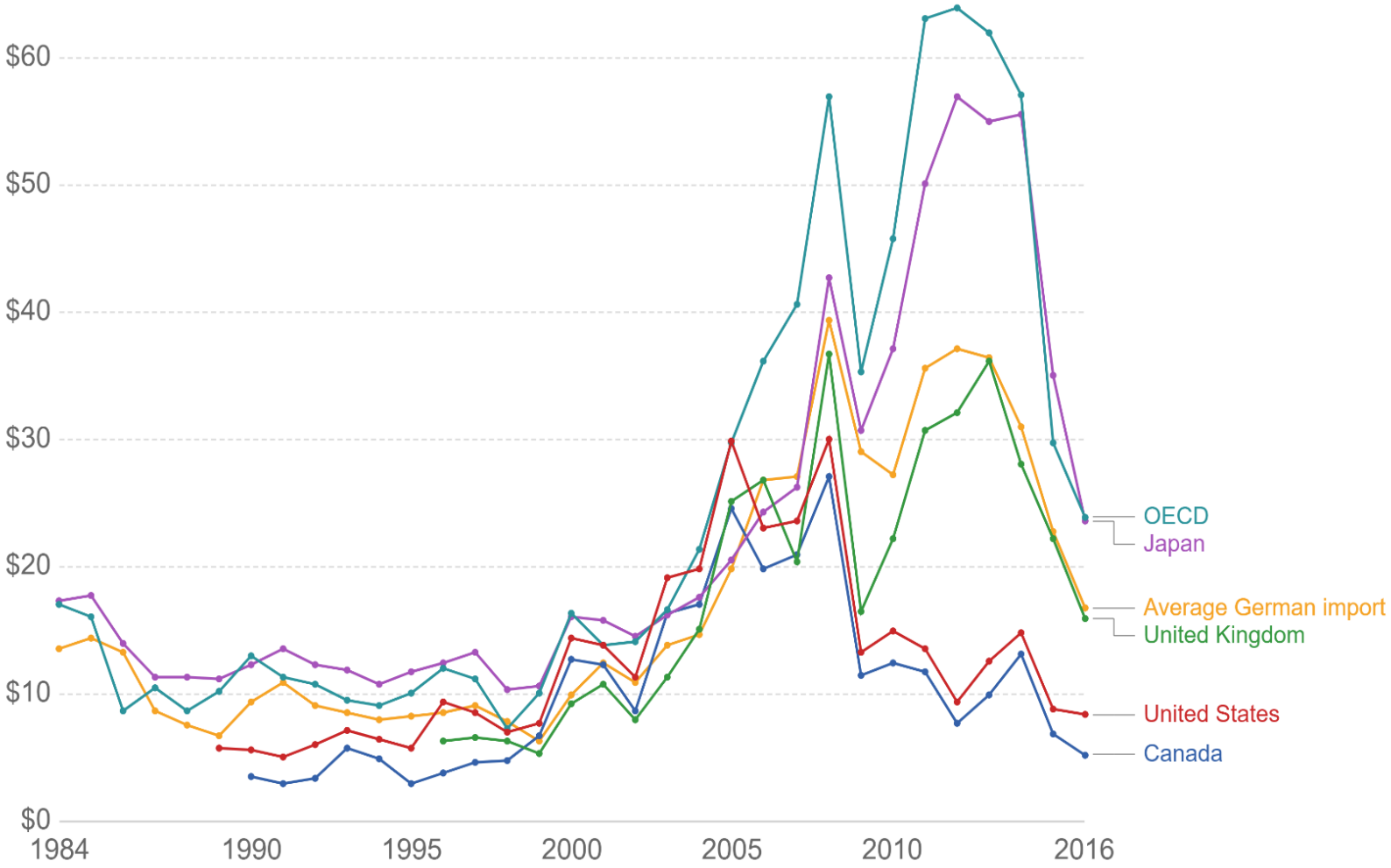
Natural gas prices, US$ per MWh

Natural gas prices, measured in US dollars per megawatt-hour (MWh) by country or regional source.



Source: BP Statistical Review of Global Energy

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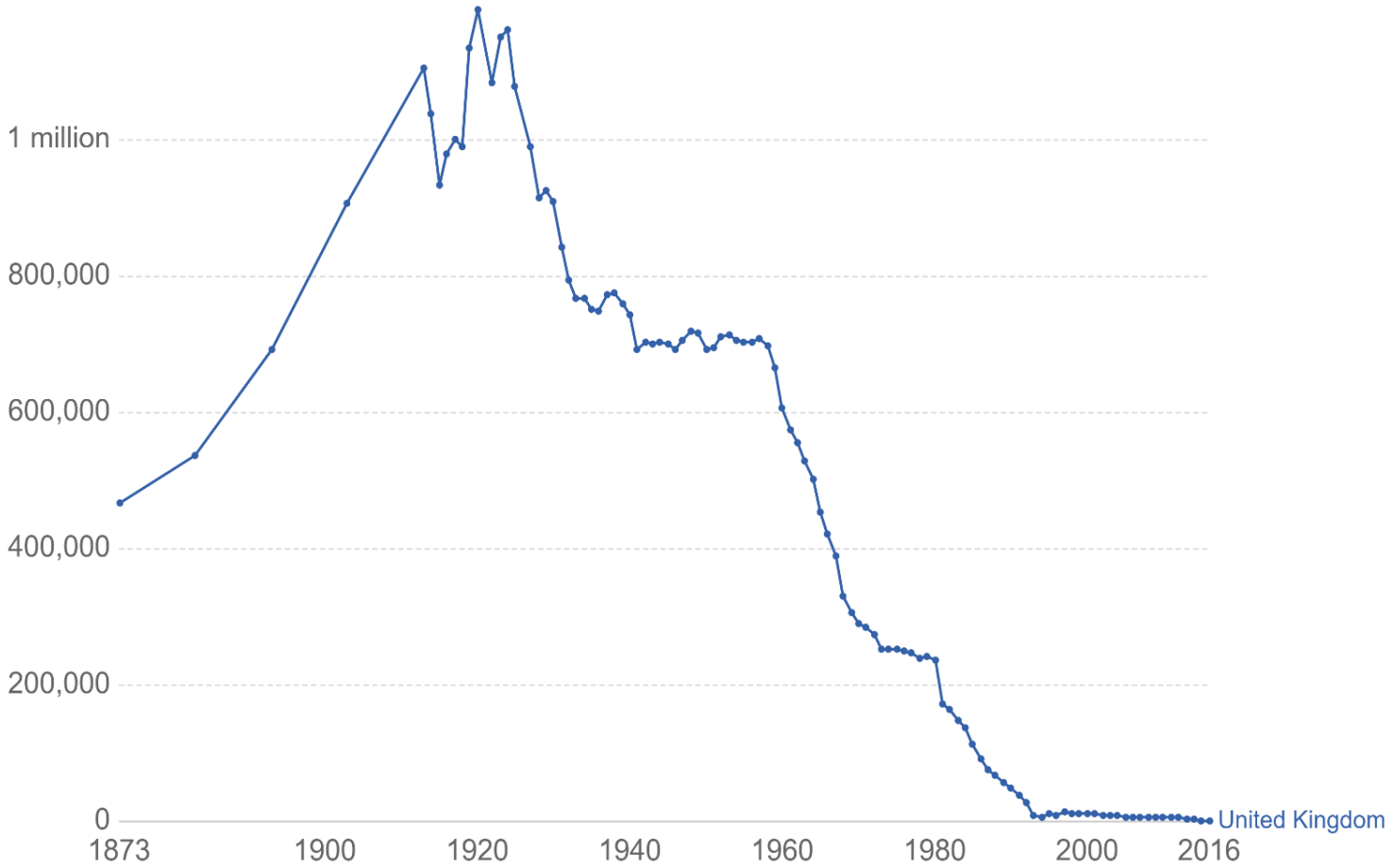
Employment in the coal industry in the United Kingdom, 1873-2016

Total number of individuals employed in the coal industry in the United Kingdom from 1873-2016. Figures include those employed as contractors by the coal industry.



Source: UK Department for Energy and Climate Change (DECC)

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Carbon Dioxide Emissions Factor, kg CO_2 per MWh

Carbon dioxide (CO_2) emissions factor, measured in kilograms of CO_2 produced per megawatt-hour (MWh) of energy produced from a given fossil fuel source.

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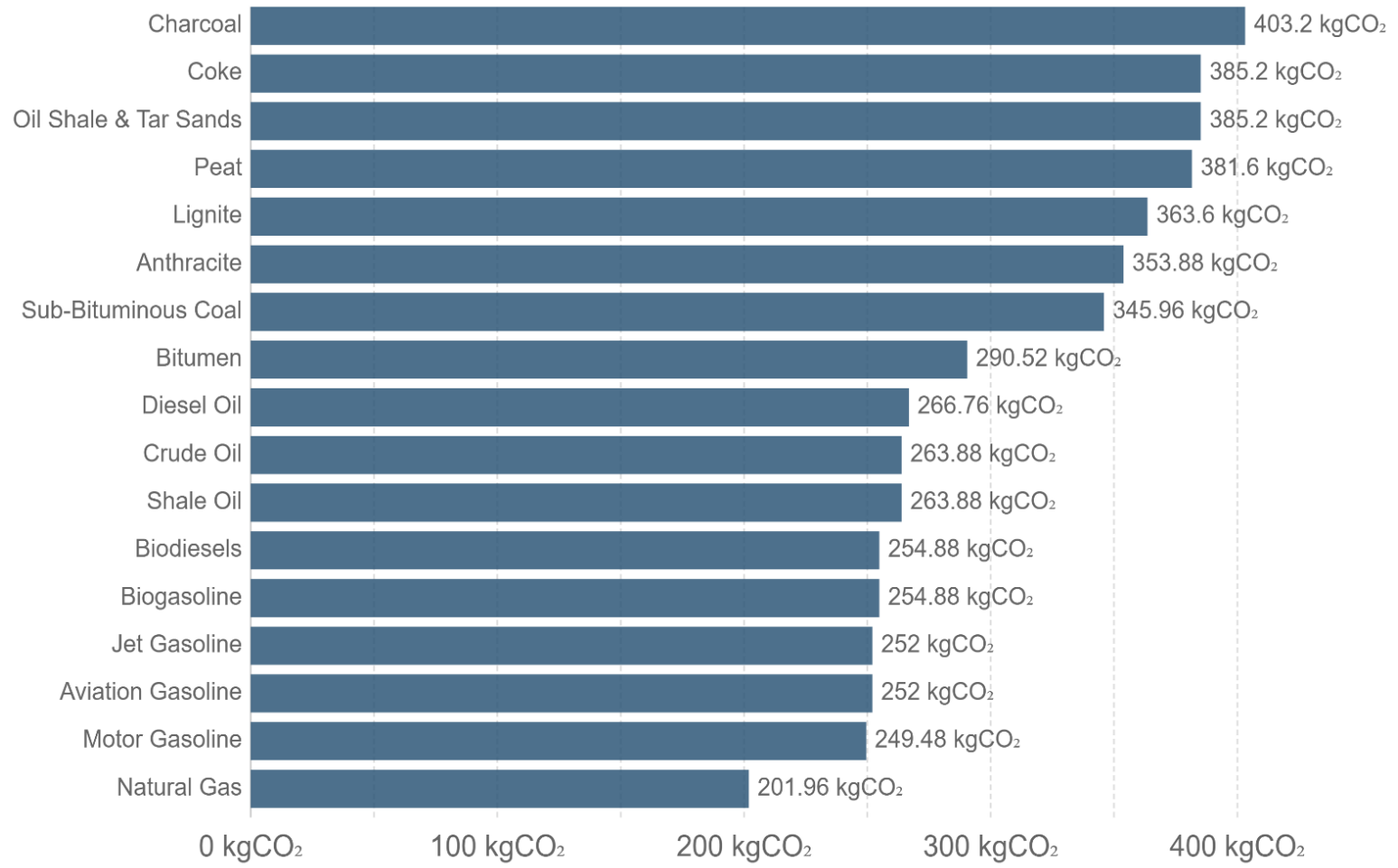

Source: Intergovernmental Panel on Climate Change (IPCC)

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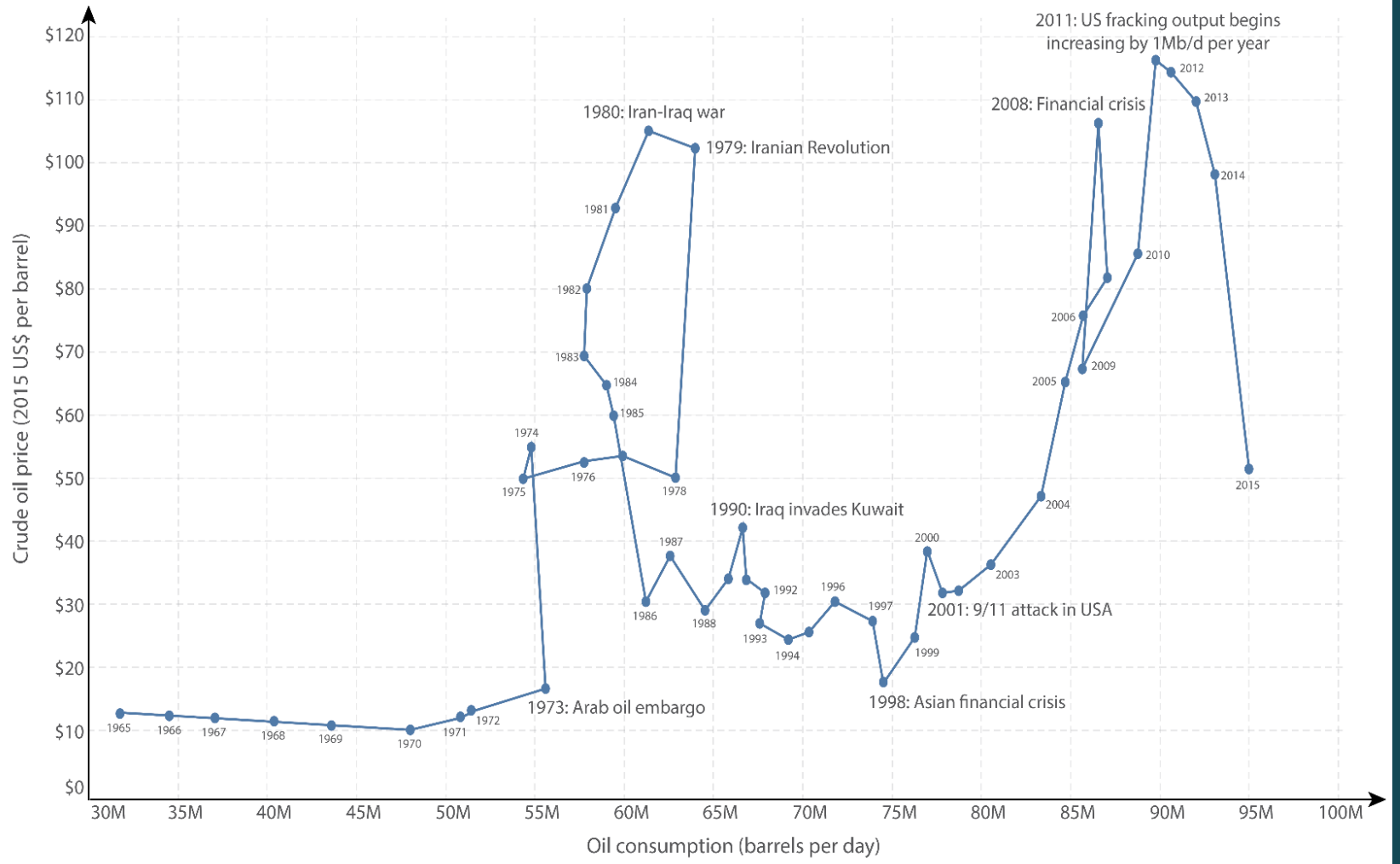
World crude oil price vs. oil consumption (1965 to 2015)

Global crude oil price, measured in 2015 US$ per barrel, versus total oil consumption, measured in barrels consumed per day.
Oil prices are based on average crude oil prices as the Arabian Light series from 1965-1983 and Brent dated series from 1984-2015.

Our World in Data

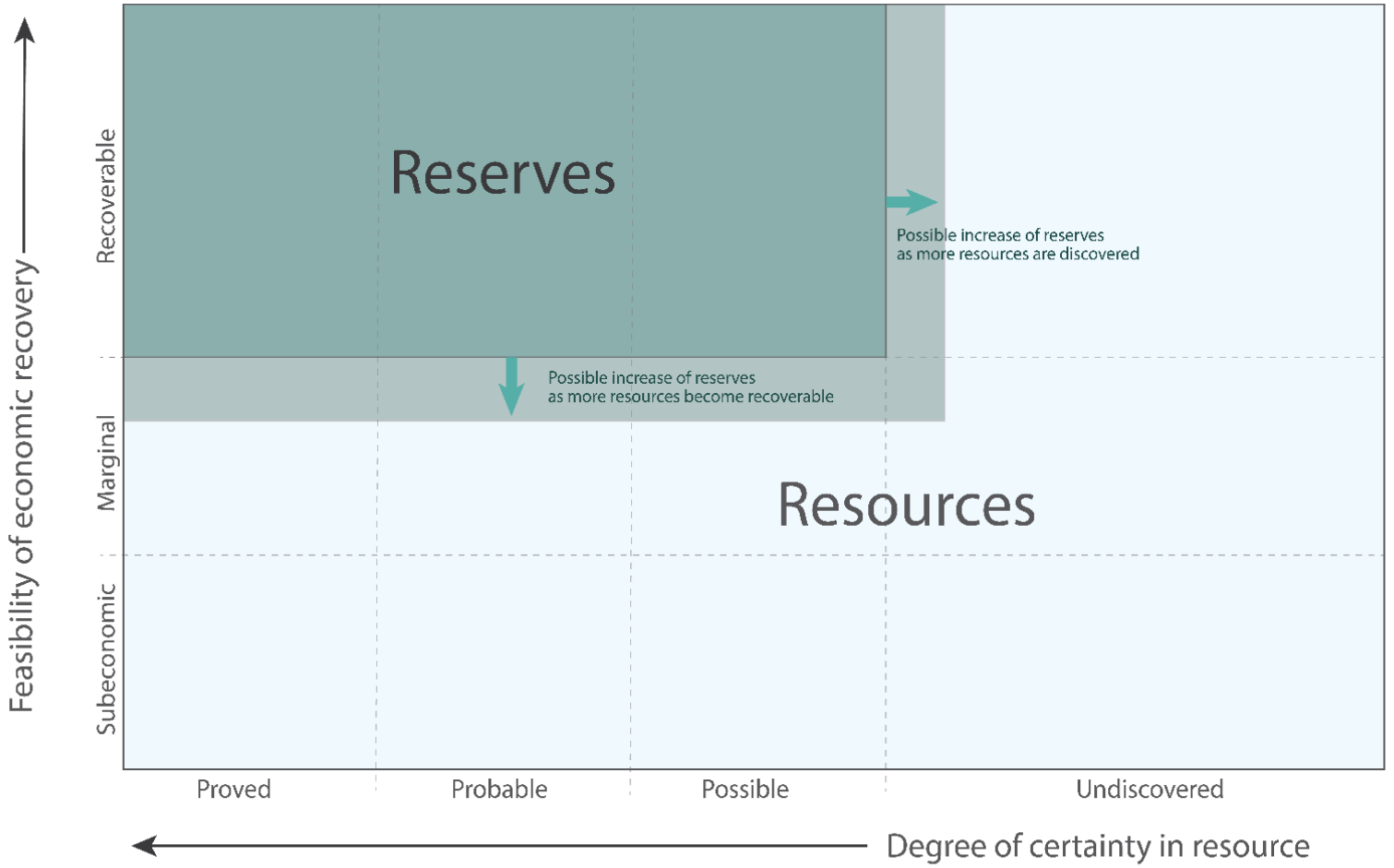


Data source: BP Statistical Review of World Energy 2016
The data visualization is available at OurWorldinData.org. There you find research and more visualizations on this topic.

Licensed under CC-BY-SA by the authors Hannah Ritchie and Max Roser.

Reserves vs. resources: What turns resources into reserves?

Once discovered, natural 'resources' are defined as 'reserves' if they are determined to be economically recoverable.
The potential expansion of the 'reserves' category is shown to represent the dynamic nature of mineral resource extraction; economic and technological developments may allow for previously unknown or economically unviable resources to be extracted.



This is a version of 'McKelvey's Box' as suggested by American geologist Vincent Ellis McKelvey (1973).
The data visualization is available at OurWorldinData.org. There you find research and more visualizations on this topic.

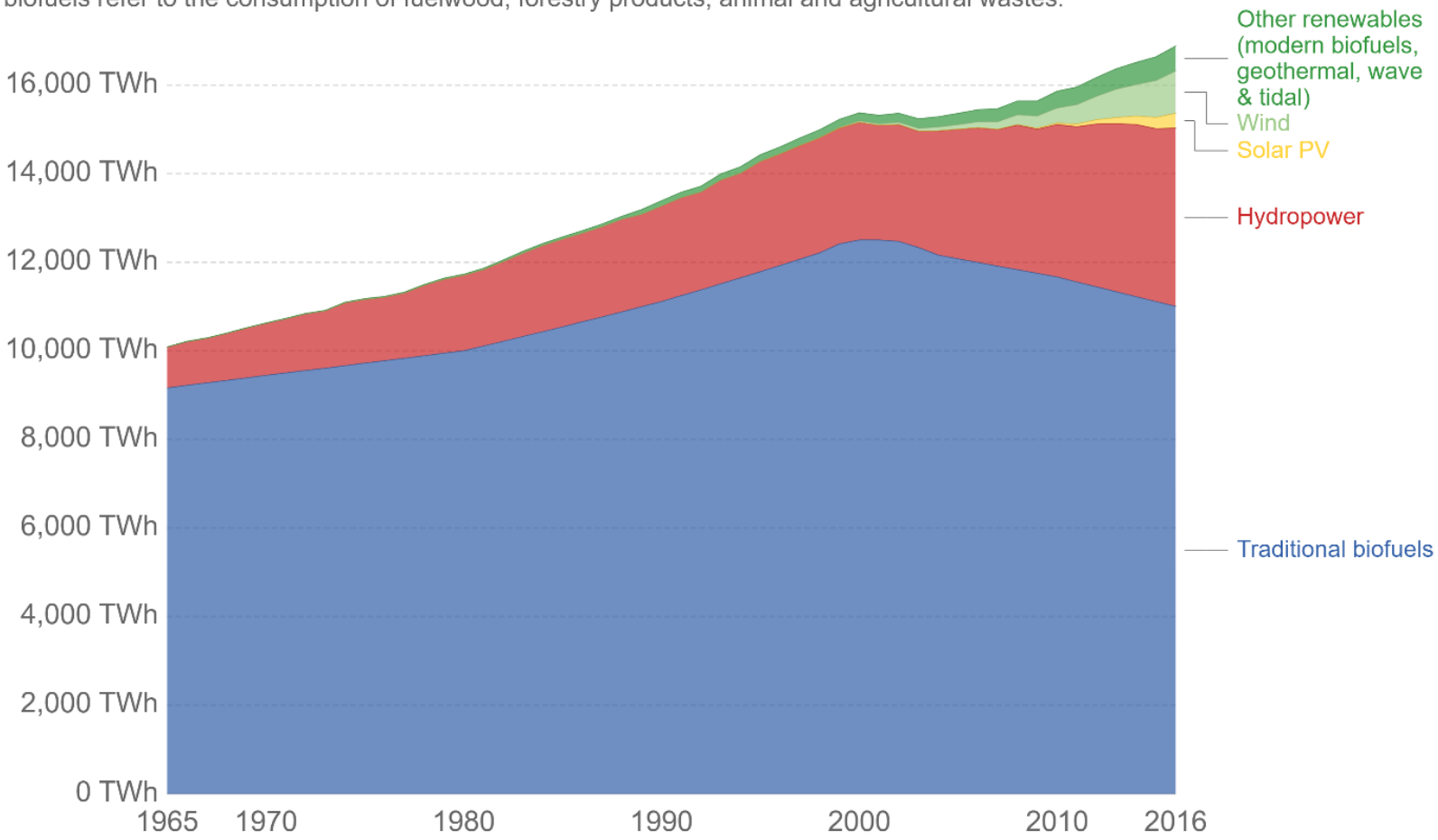
Licensed under CC-BY-SA by the author Hannah Ritchie and Max Roser.

Renewables

Subtitle

Global renewable energy consumption, terawatt-hours

Total renewable energy consumption over the long-term, measured in terawatt-hours (TWh) per year. Traditional biofuels refer to the consumption of fuelwood, forestry products, animal and agricultural wastes.

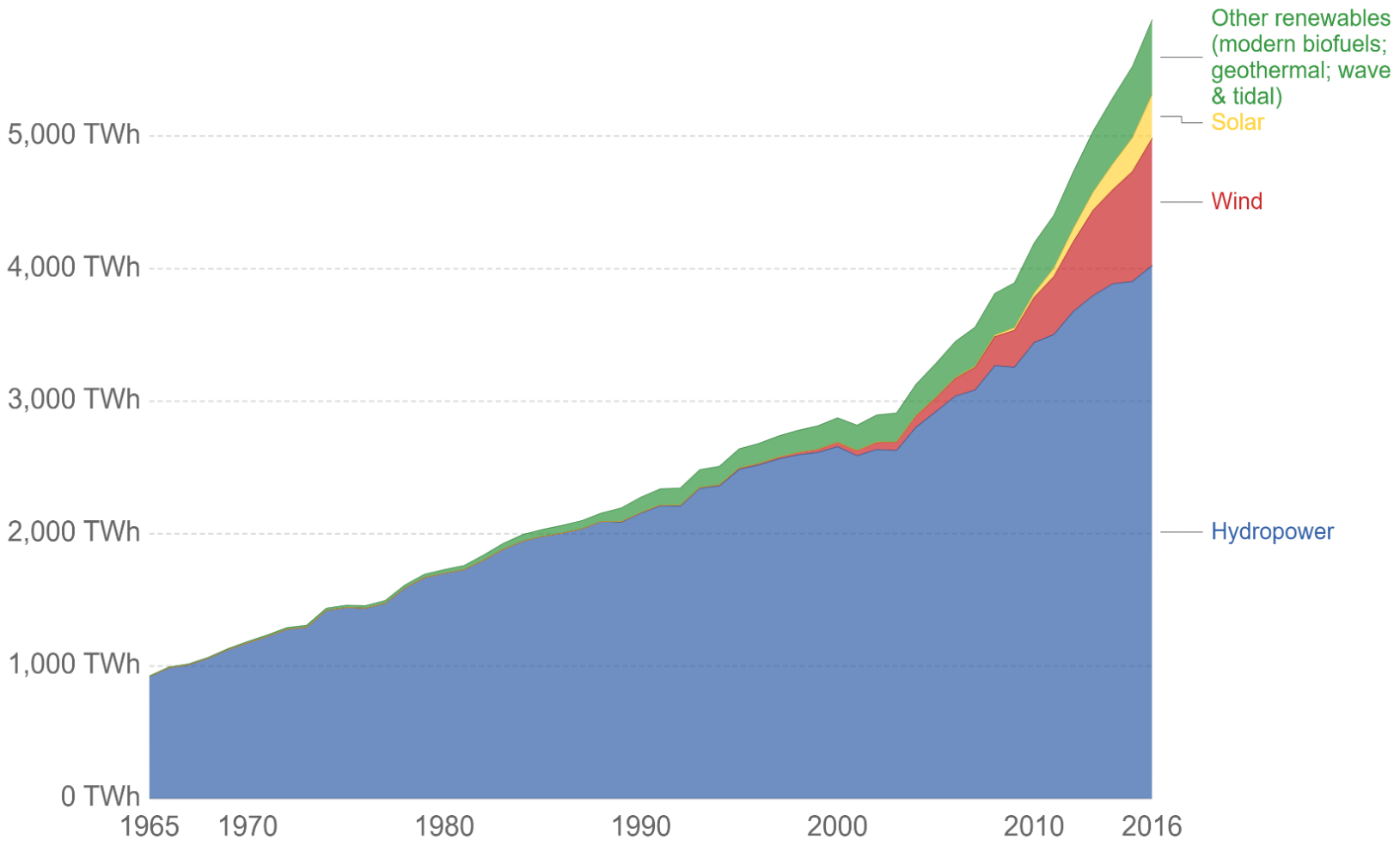


Source: Global Energy Production by Source - Vaclav Smil (2017), BP Statistical Review of Global Energy
OurWorldInData.org/renewables • CC BY-SA

Modern renewable energy consumption, World

Total renewable energy consumption, measured in terawatt-hours (TWh) per year. This data includes all renewable energy sources with the exclusion of traditional biomass.

Our World in Data



Source: BP Statistical Review of Global Energy

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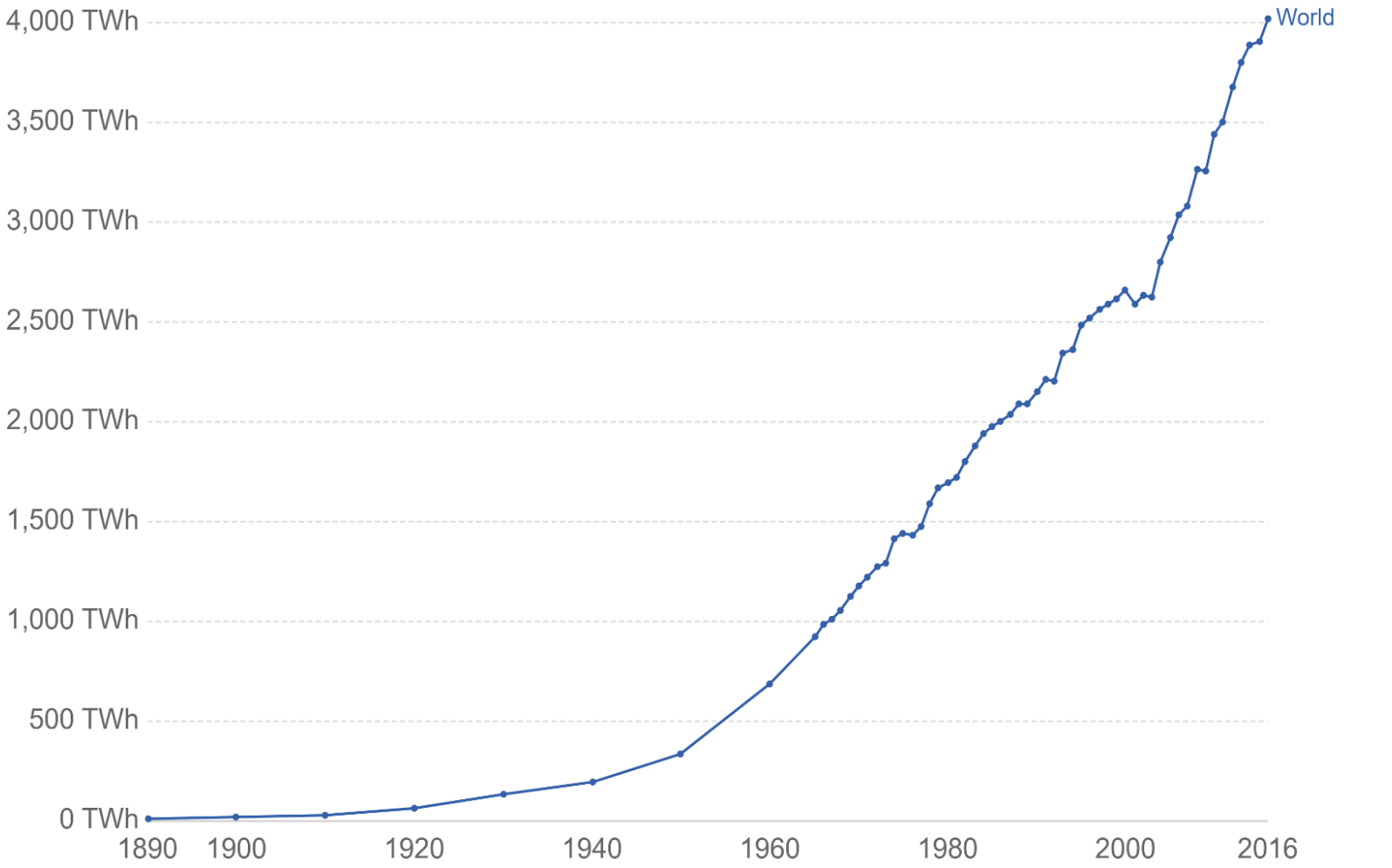
Global hydroelectric power consumption, terawatt-hours

Global hydroelectric power consumption over the long-term, measured in terawatt-hours (TWh) per year.



Source: Smil (2017) & BP Statistical Review

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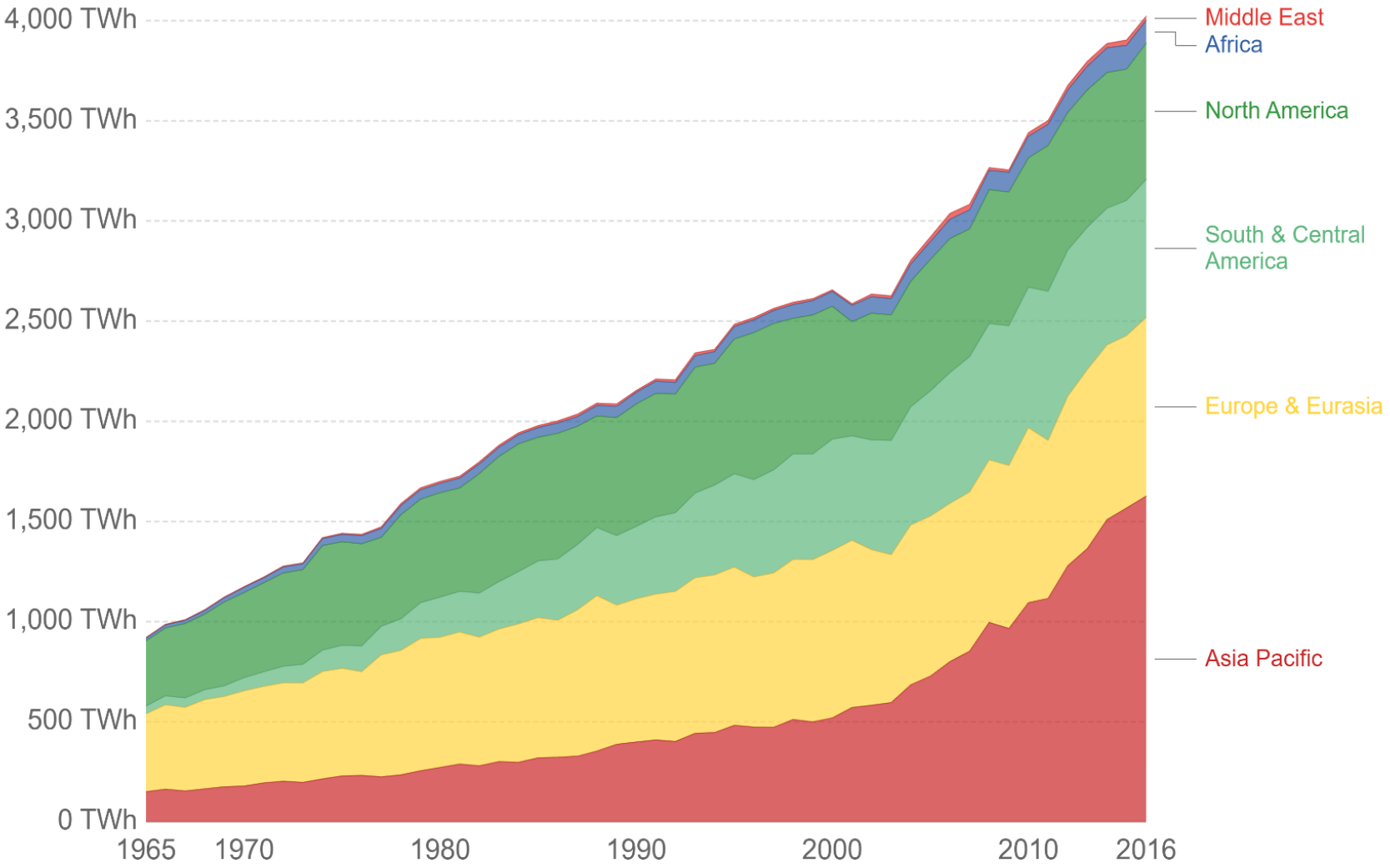
Hydropower consumption by region, terawatt-hours

Annual hydropower consumption by region, measured in terawatt-hours (TWh) per year.



Source: BP Statistical Review of Global Energy

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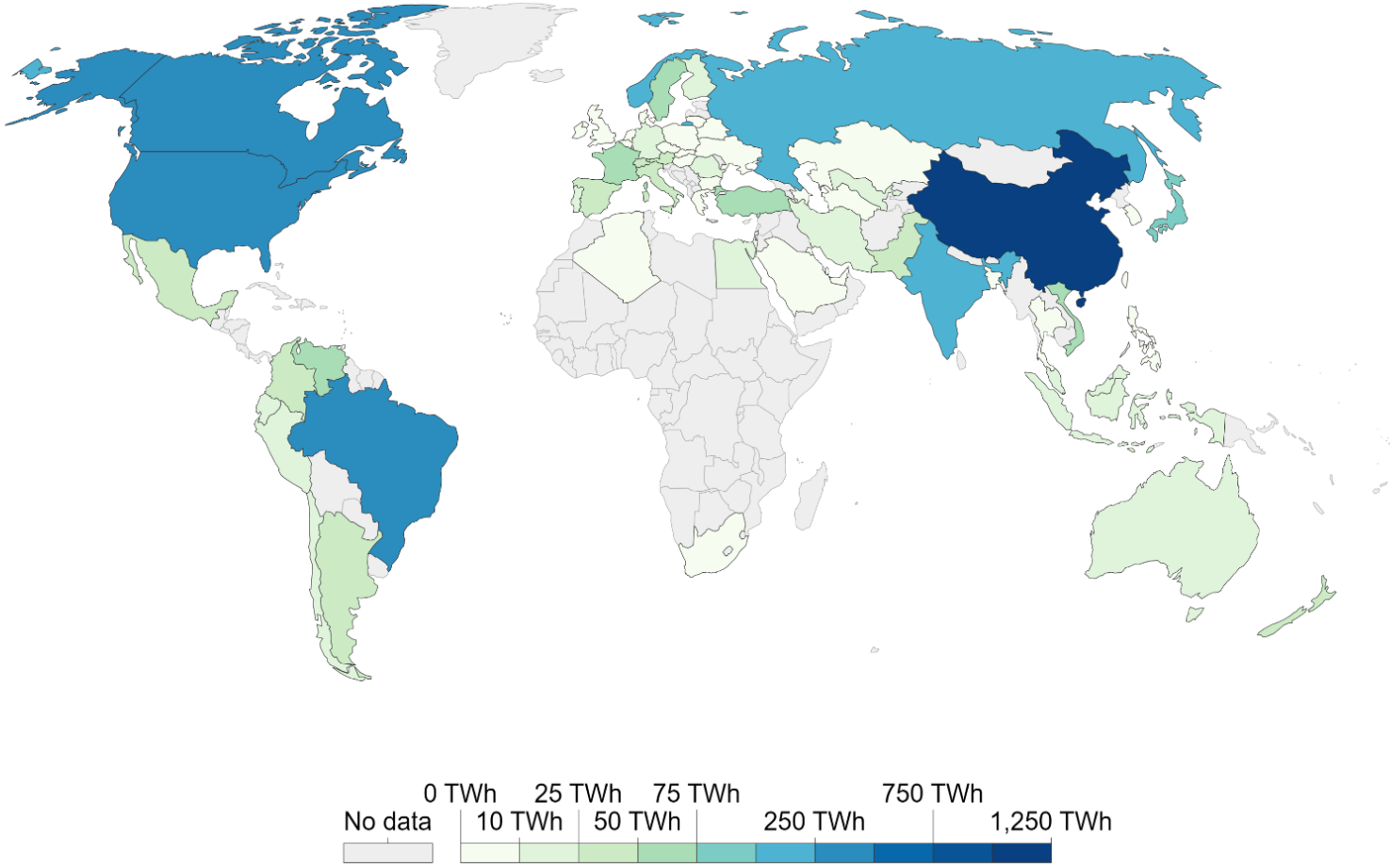
Hydropower consumption, terawatt-hours, 2016

Annual hydropower consumption, measured in terawatt-hours (TWh) per year.

Our World in Data



Source: BP Statistical Review of Global Energy

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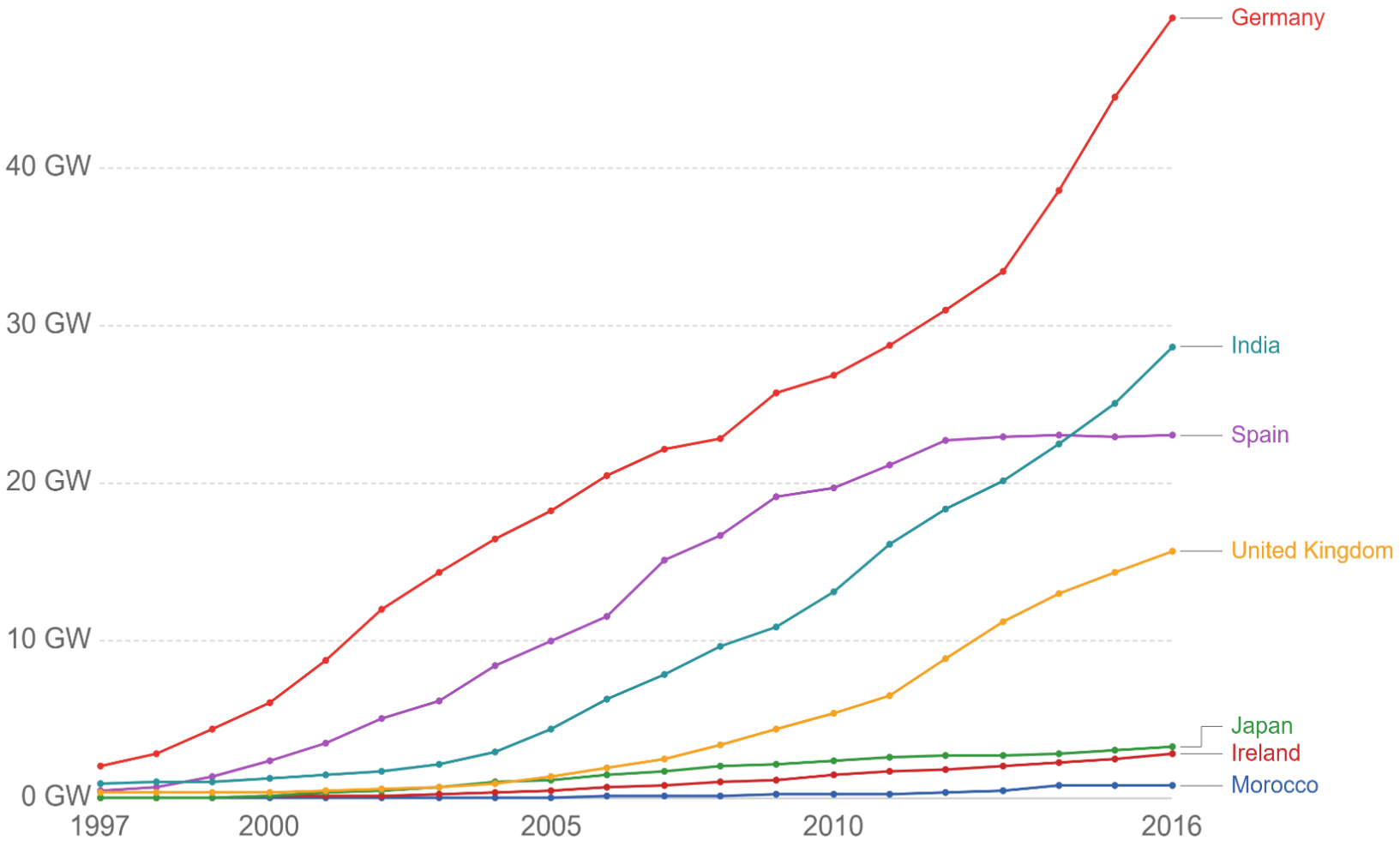
Cumulative installed wind energy capacity, gigawatts

Cumulative installed wind energy capacity including both onshore and offshore wind sources, measured in gigawatts (GW).

Our World in Data



Source: BP Statistical Review of Global Energy

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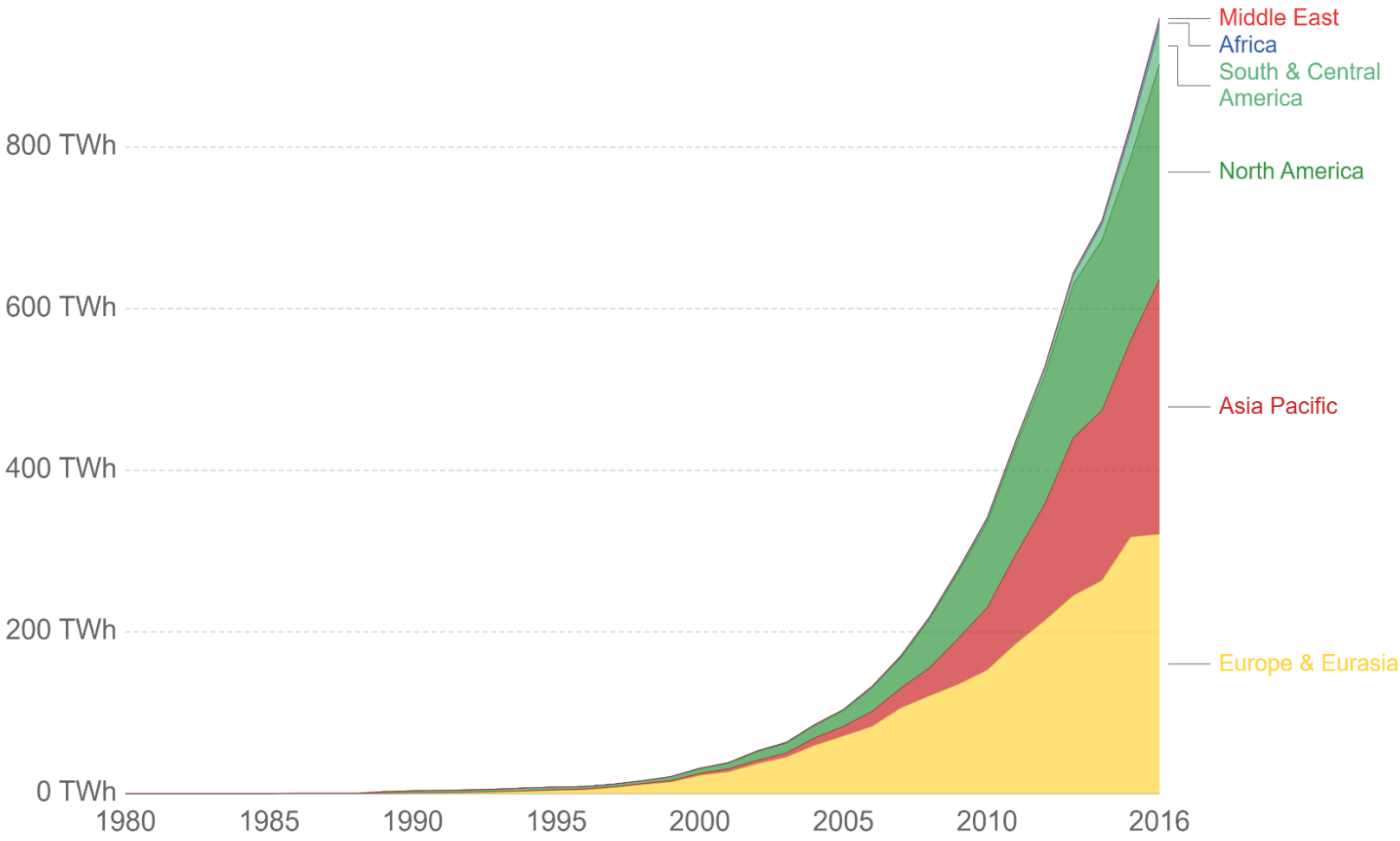
Wind energy consumption by region, terawatt-hours

Total wind energy consumption by region, measured in terawatt-hours (TWh) per year. Figures include both onshore and offshore wind sources.

Our World in Data



Source: BP Statistical Review of Global Energy

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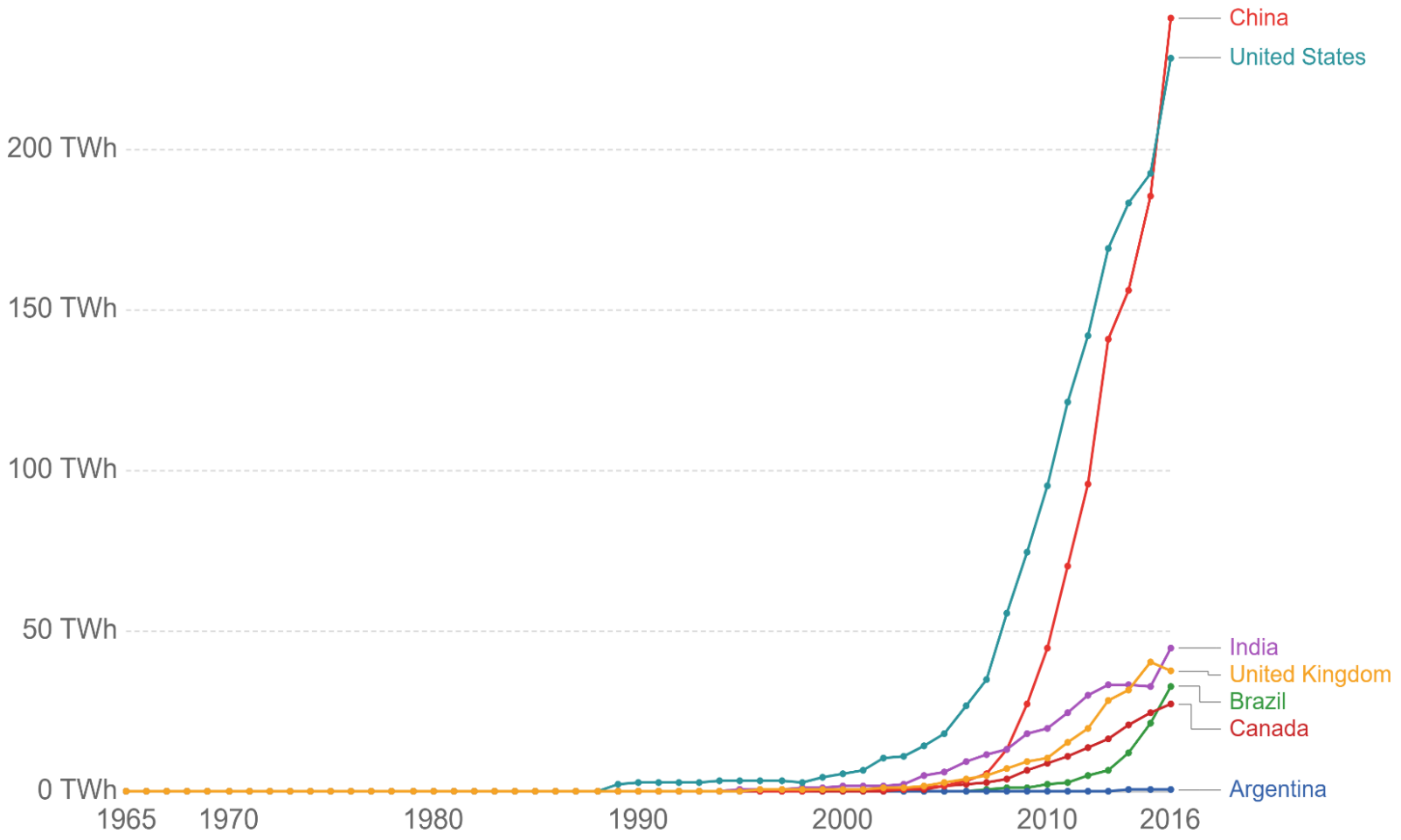
Wind energy consumption, terawatt-hours (TWh)

Annual wind energy consumption by country or region, measured in terawatt-hours (TWh) per year. Data includes both onshore and offshore wind sources.

Our World in Data



Source: BP Statistical Review of Global Energy

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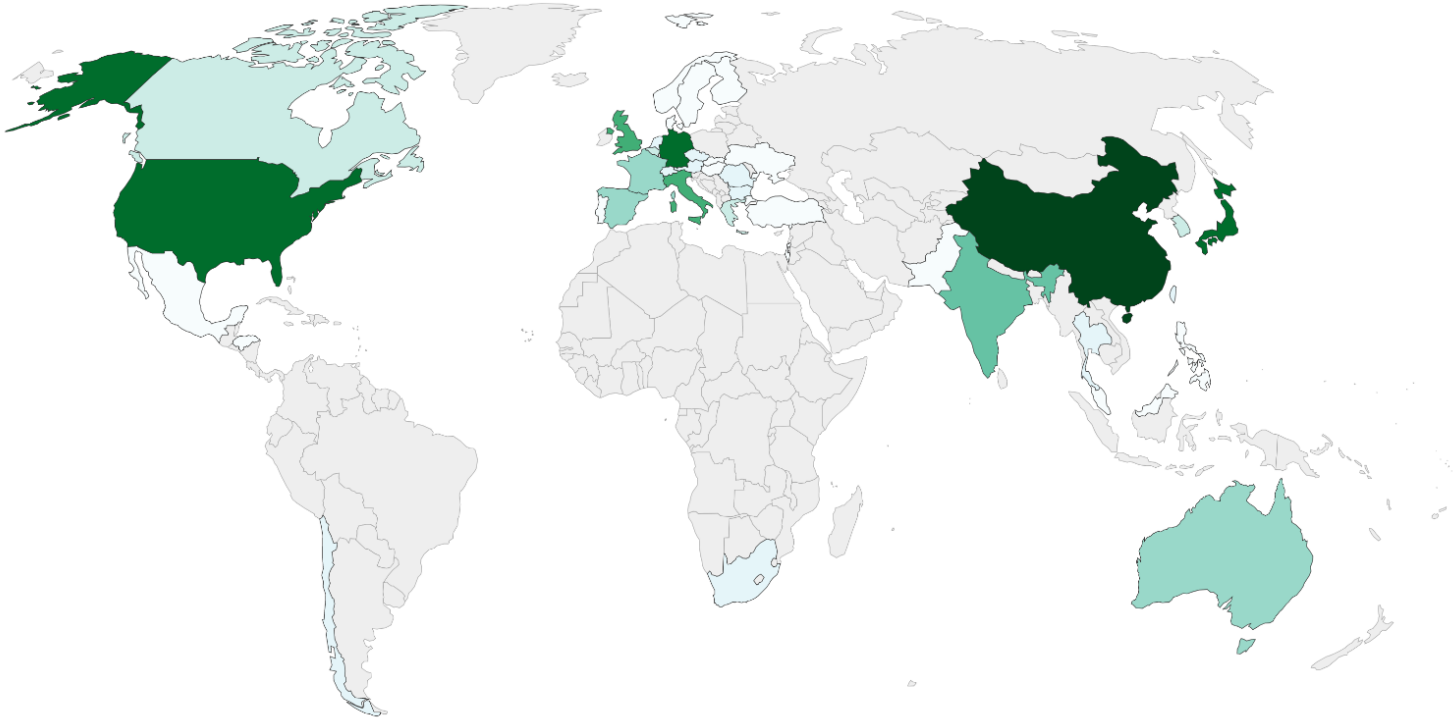
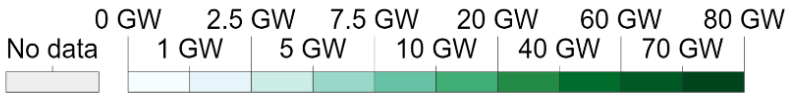
Installed solar photovoltaic (PV) capacity, gigawatts, 2016

Cumulative installed solar photovoltaic (PV) capacity, measured in gigawatts (GW).

Our World in Data





Source: BP Statistical Review of Global Energy

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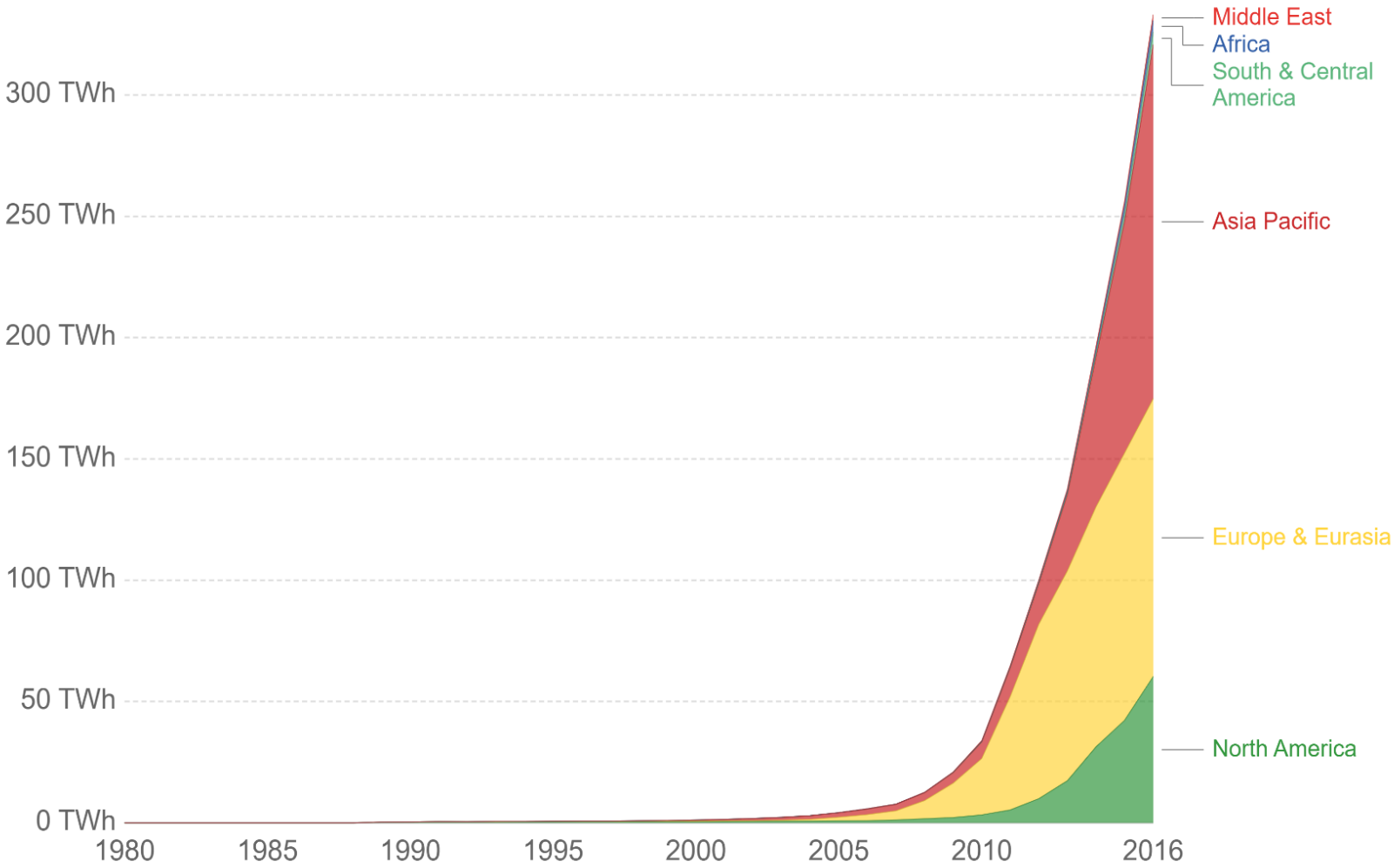
Solar PV energy consumption by region, terawatt-hours

Solar photovoltaic (PV) energy consumption by region, measured in terawatt-hours (TWh) per year.



Source: BP Statistical Review of Global Energy

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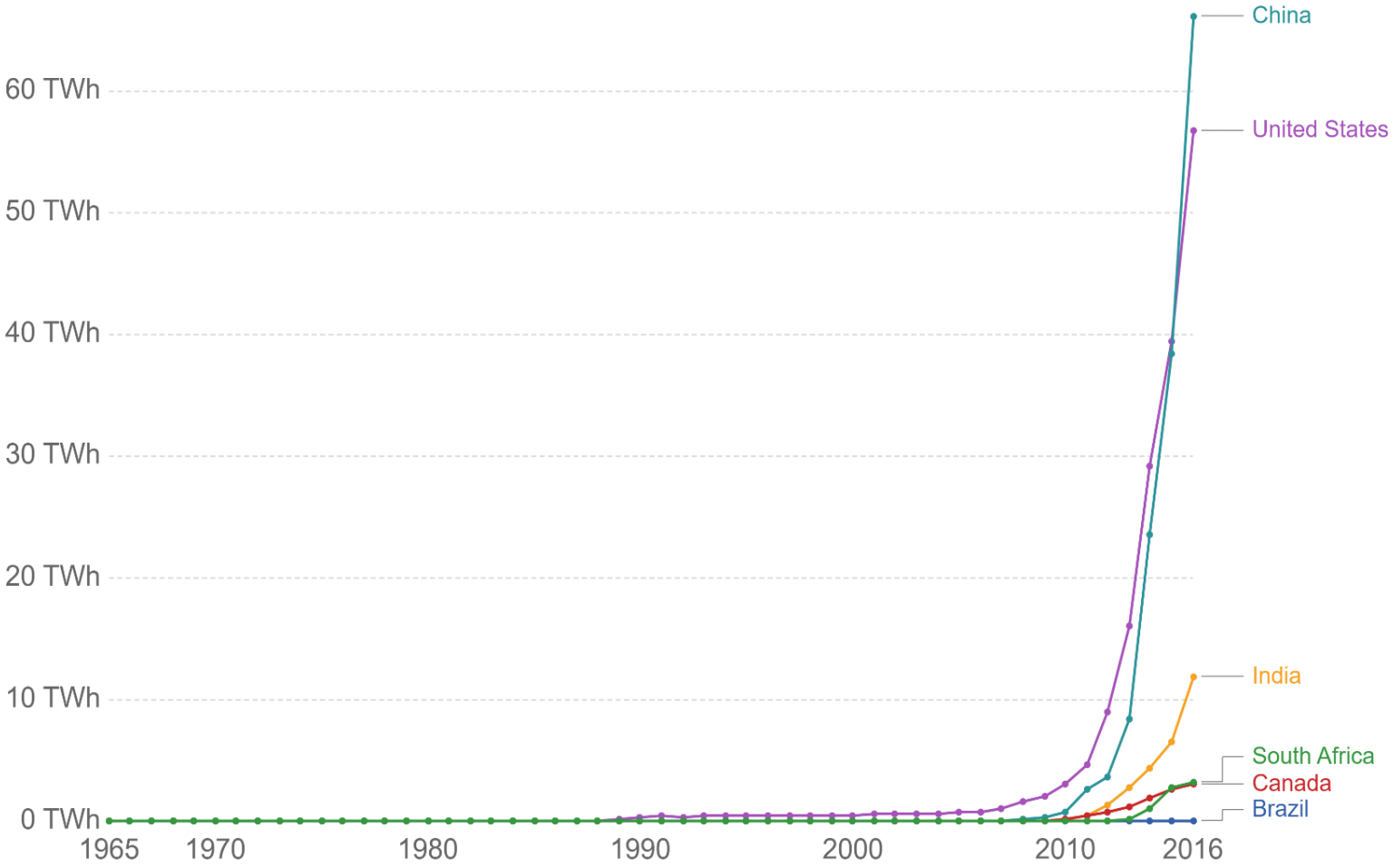
Solar PV energy consumption, terawatt-hours per year

Total solar photovoltaic (PV) energy consumption by country or region, measured in terawatt-hours (TWh) per year.



Source: BP Statistical Review of Global Energy

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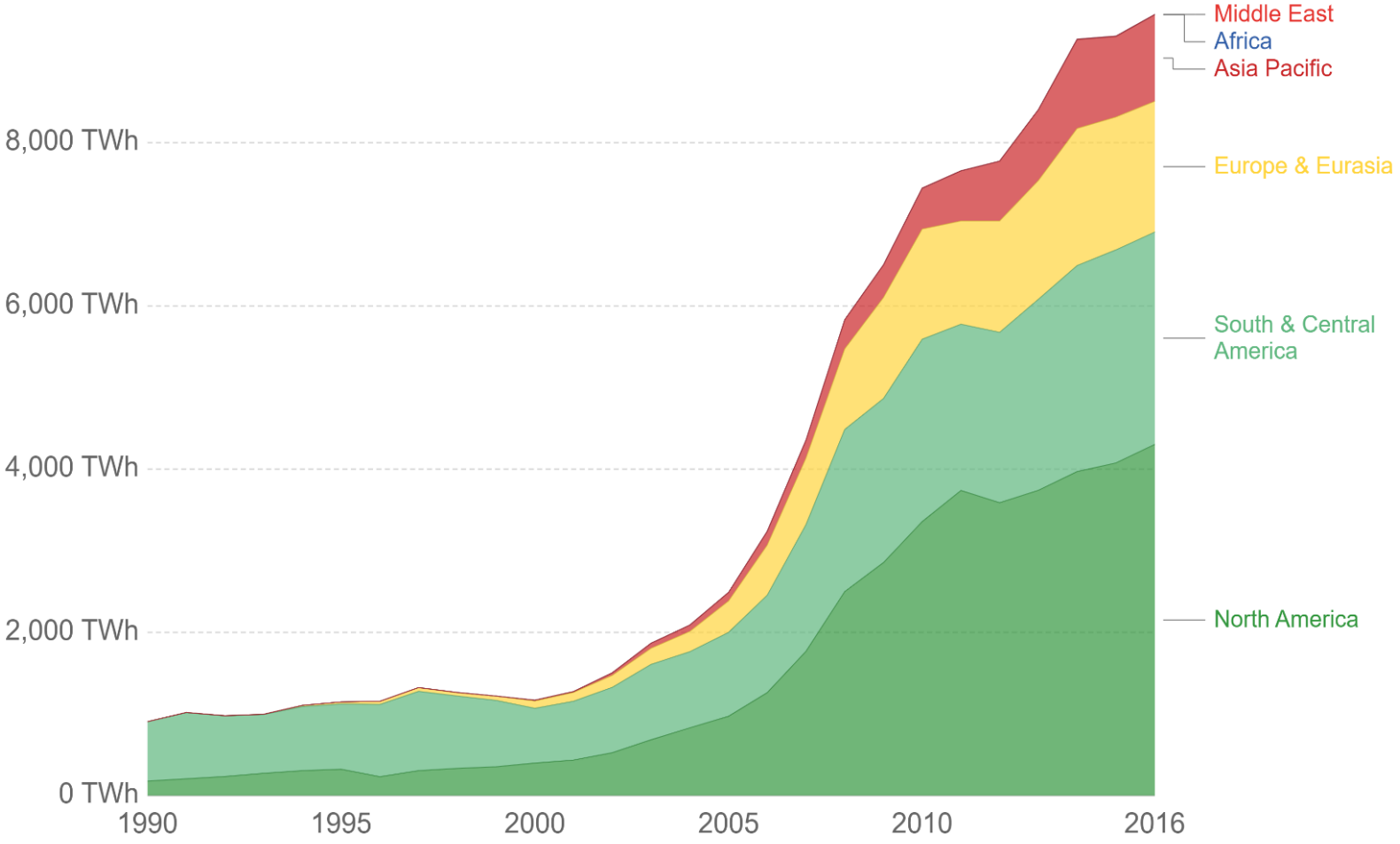
Biofuel production by region, terawatt-hours per year

Total biofuel production by region, measured in terawatt-hours (TWh) per year. Biofuel production includes both bioethanol and biodiesel.



Source: BP Statistical Review of Global Energy

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Biofuel production, terawatt-hours per year

Total biofuel production, measured in terawatt-hours (TWh) per year. Biofuel production includes both bioethanol and biodiesel.

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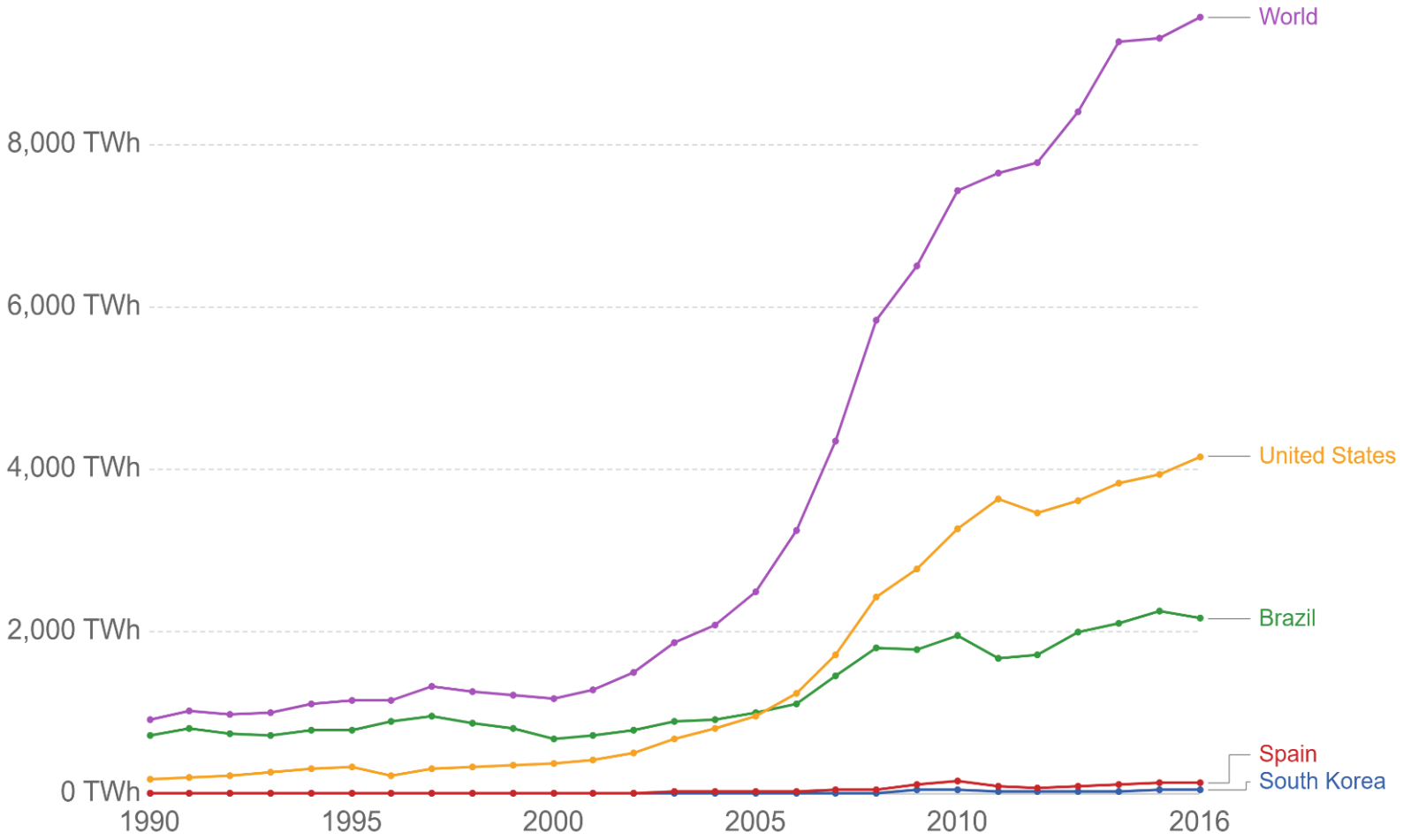

Source: BP Statistical Review of Global Energy

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Cumulative installed geothermal capacity, megawatts, 2016

Cumulative installed capacity of geothermal energy capture, measured in megawatts.

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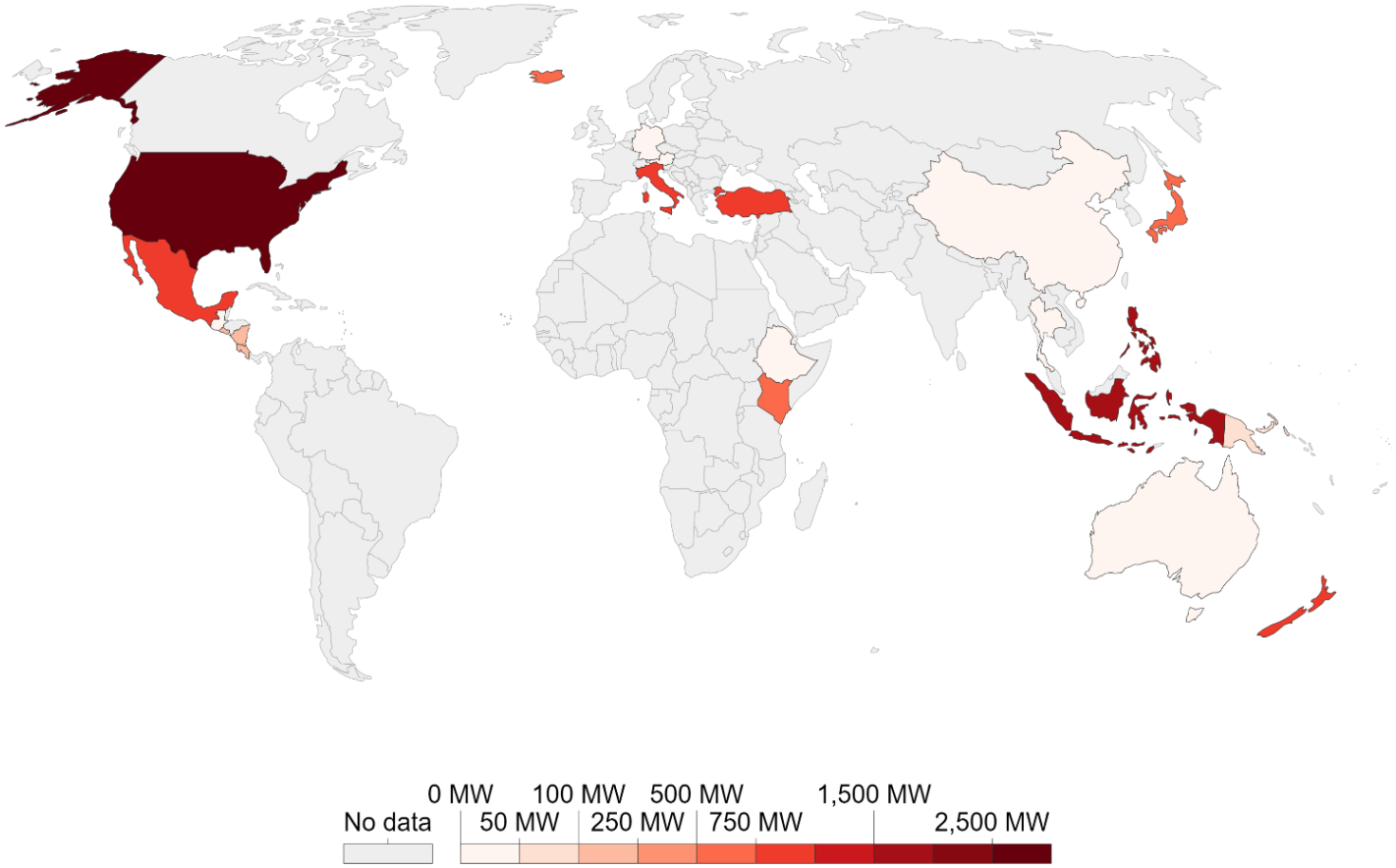

Source: BP Statistical Review of Global Energy

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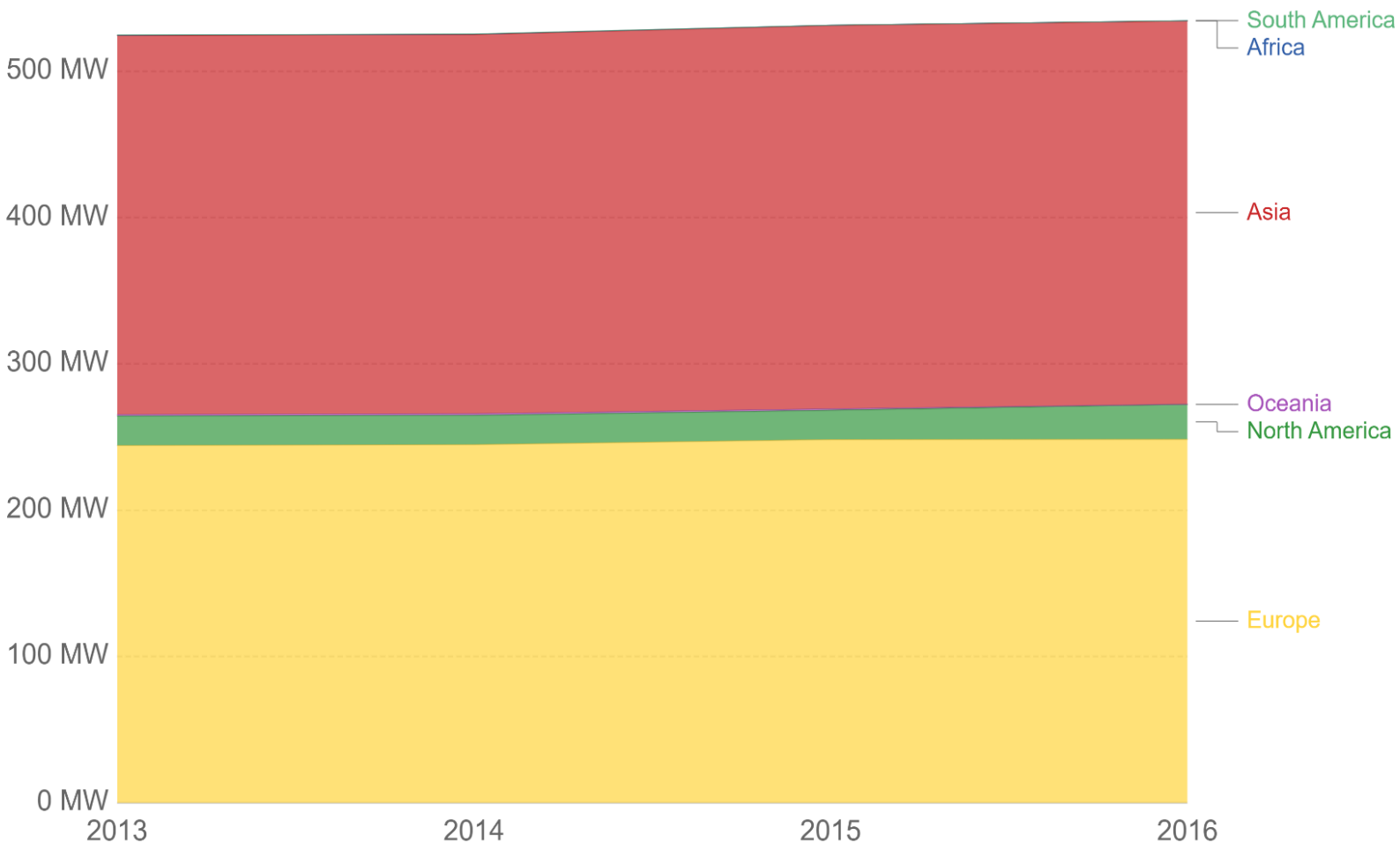
Cumulative installed marine energy capacity

Cumulative installed marine energy capacity, measured in megawatts (MW). Marine energy capacity includes both wave and tidal sources.



Source: Marine Energy Capacity and Production - IRENA

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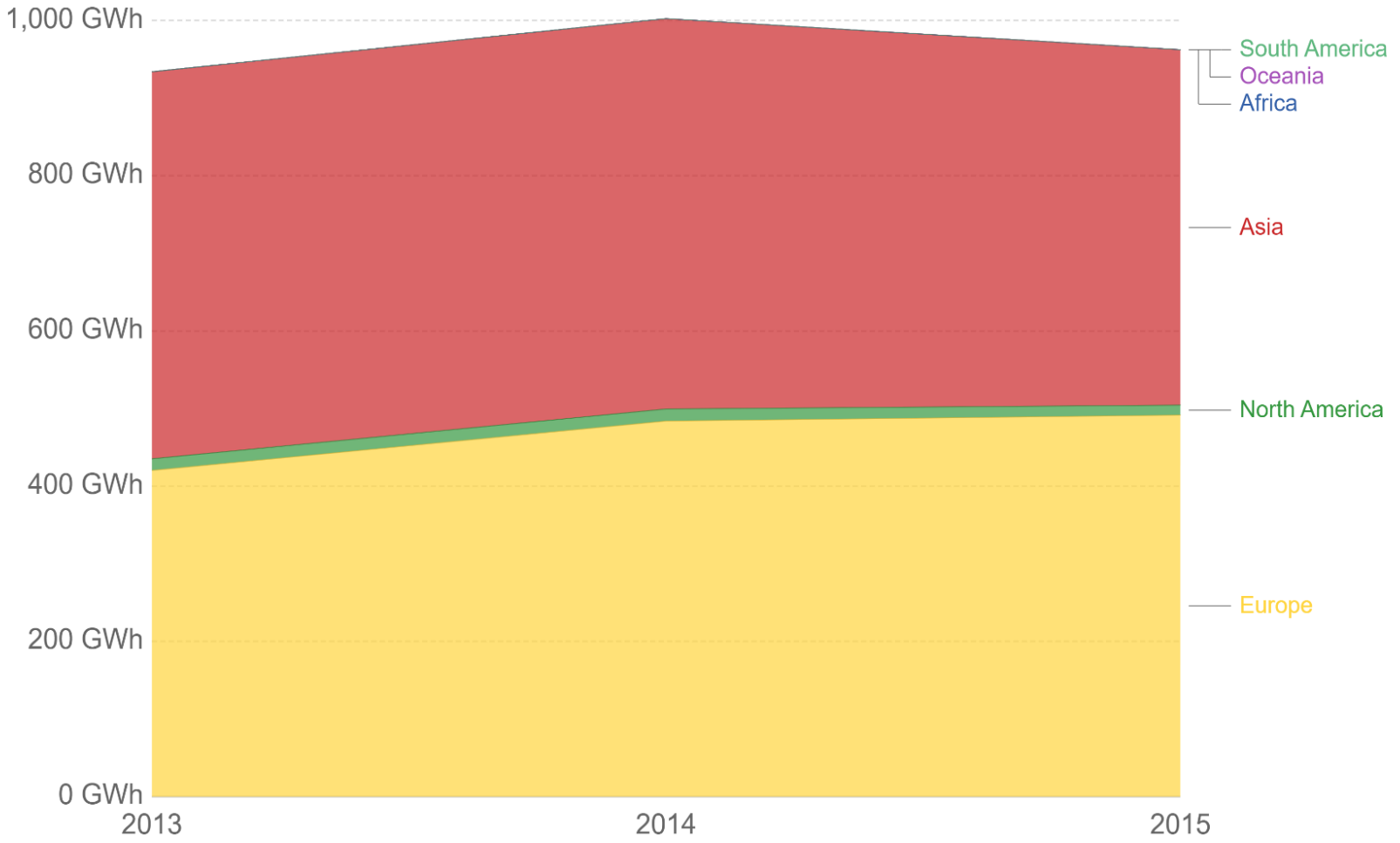
Marine energy production, gigawatt-hours

Annual marine energy production, measured in gigawatt-hours (GWh) per year. Marine energy includes generation from both wave and tidal sources.



Source: Marine Energy Capacity and Production - IRENA

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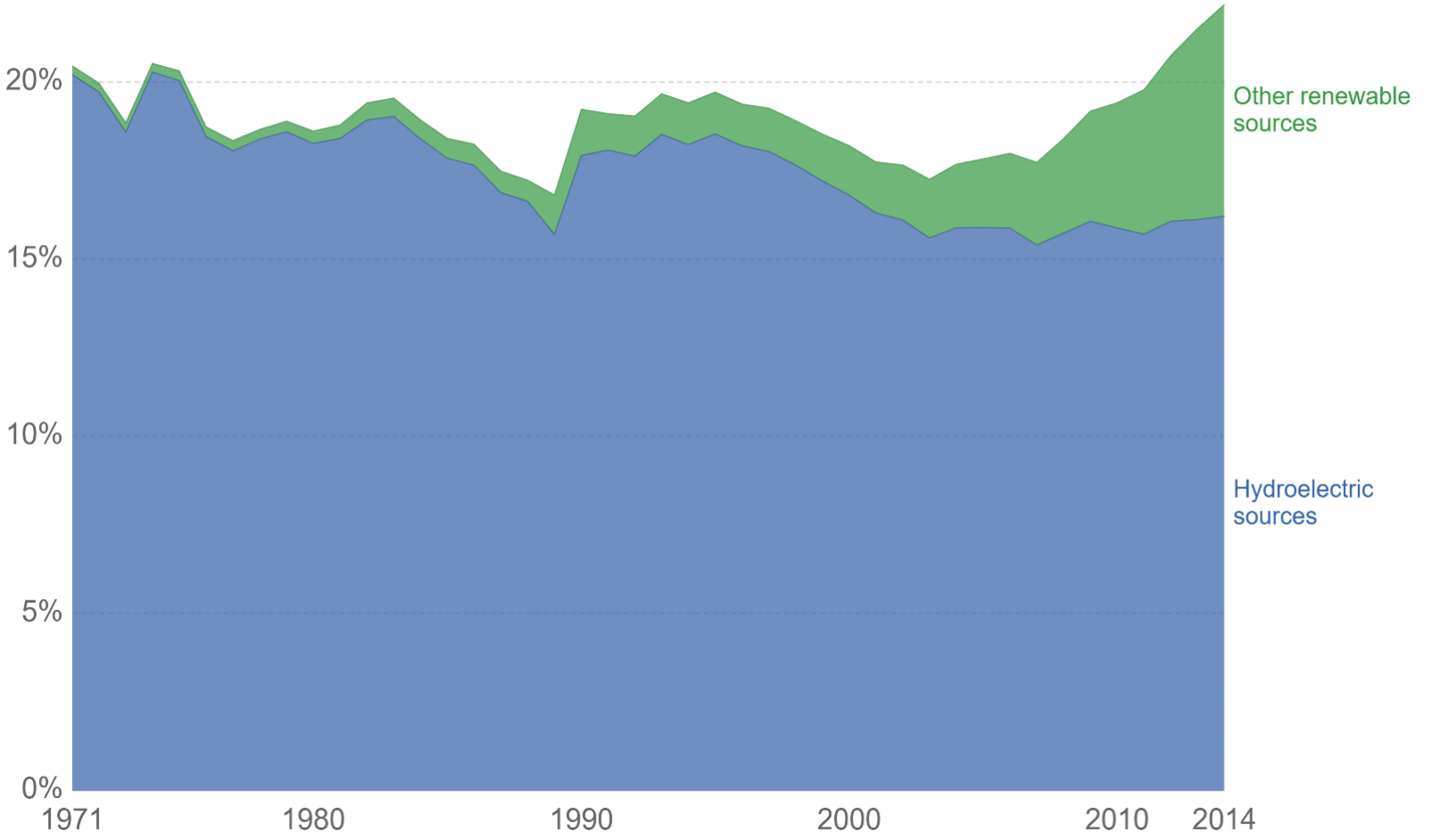
Share of electricity production from renewable sources, World

Share of renewable production in the electricity mix, measured as a percentage of total electricity production. Hydroelectric production is shown separately from other renewable sources. Other renewable sources includes solar photovoltaic (PV) wind (offshore & onshore); geothermal and biomass electricity production.



Source: International Energy Agency (IEA) via The World Bank

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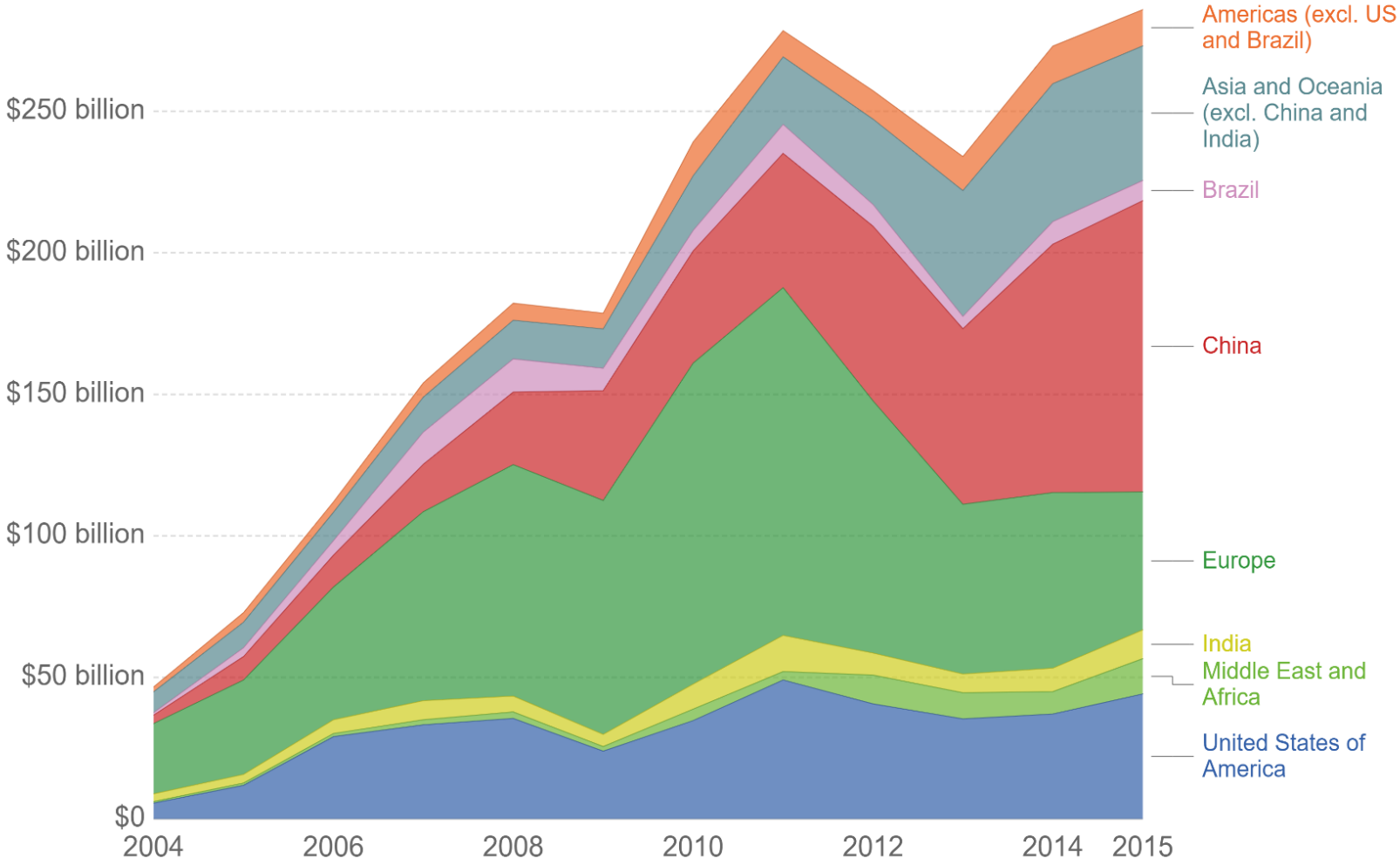
Renewable Energy Investment

Investment in renewable energy technologies per year in billion US dollars by region.



Source: International Renewable Energy Agency, 2017

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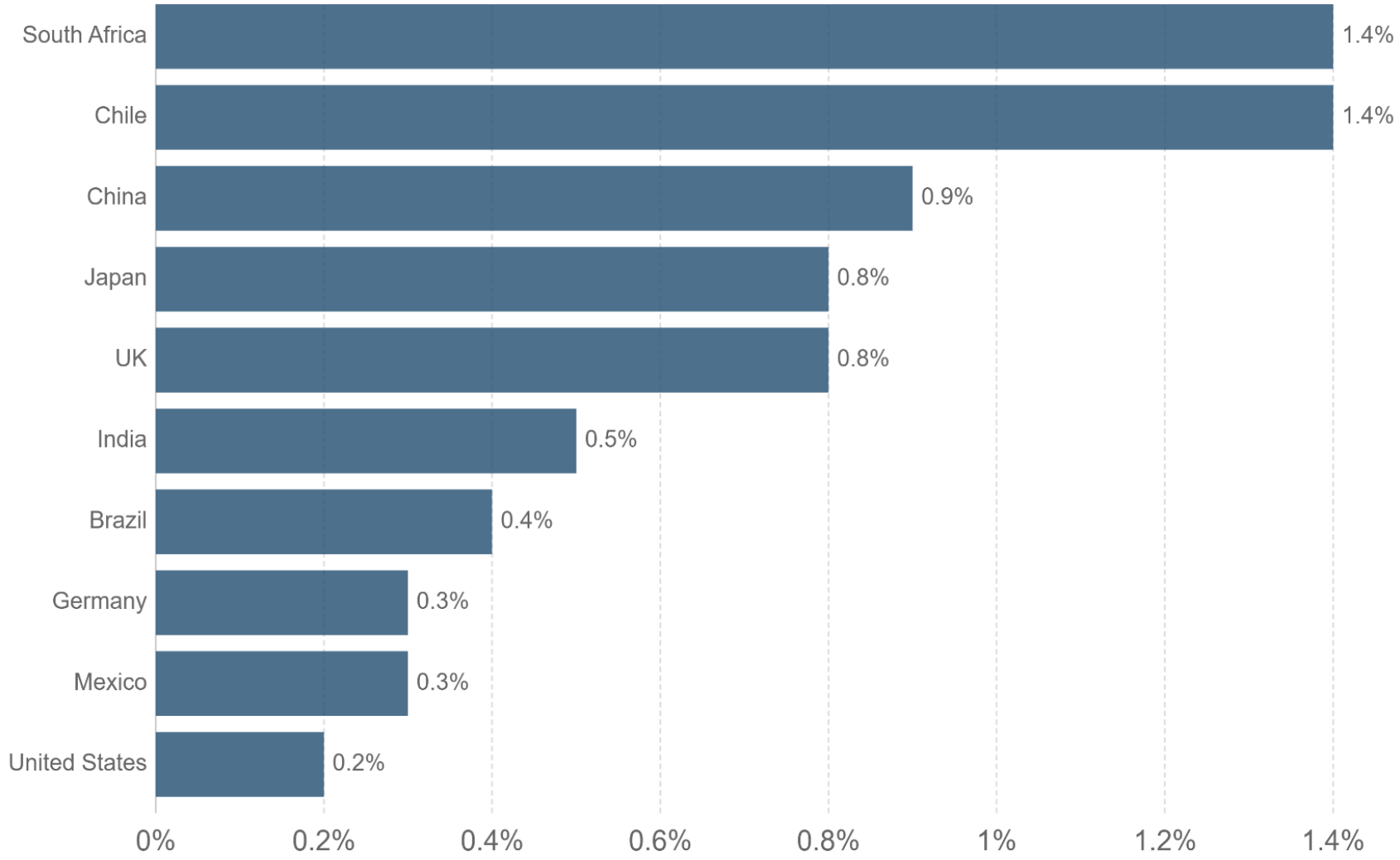
Renewable Energy Investment (% of GDP), 2015

Investment in renewable energy, given as the percentage of each nation's gross domestic product (GDP) in 2015



Source: Bloomberg New Energy Finance; World Bank

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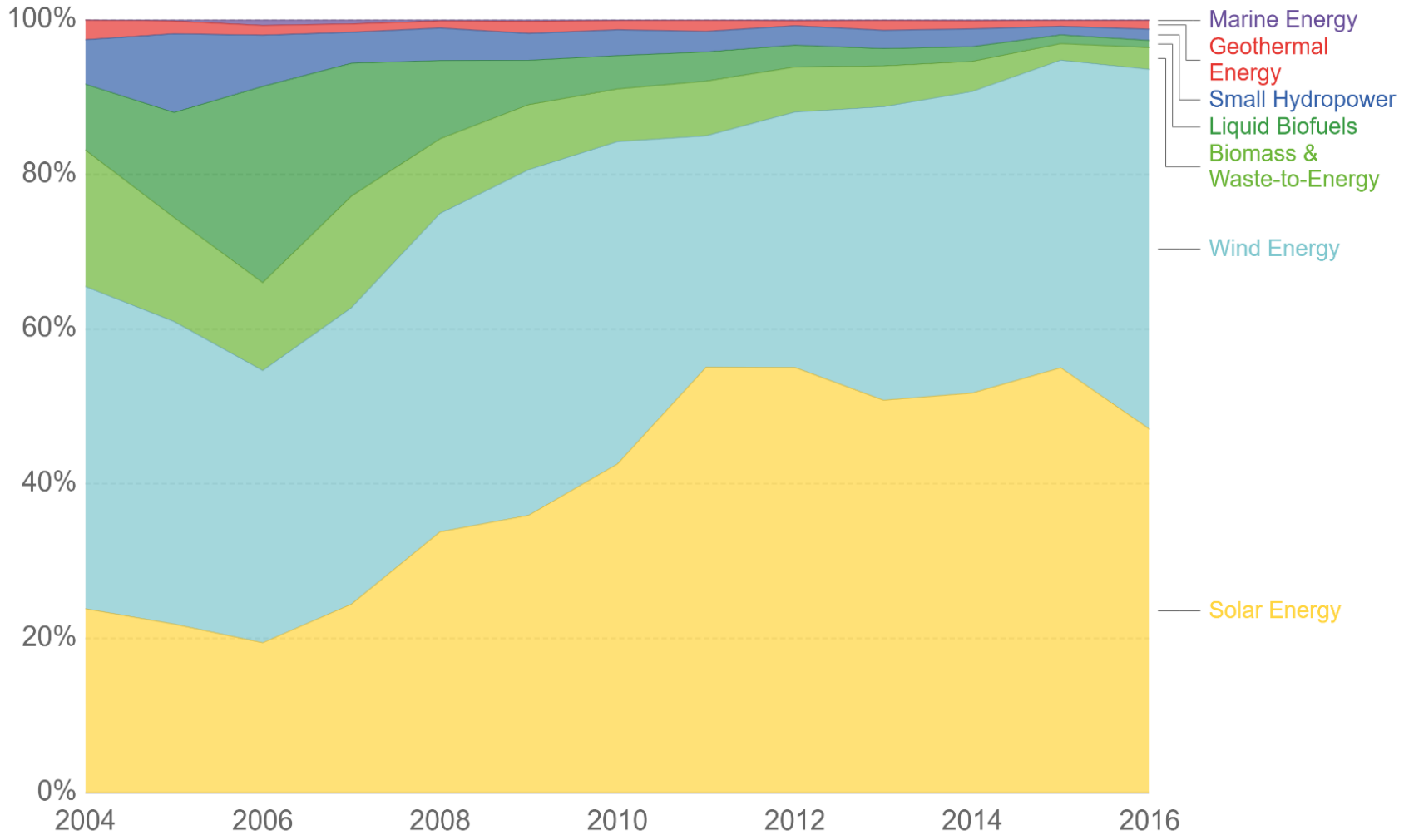
Investment in renewable energy, by technology

Global investment in renewable energy technologies, measured in billion USD per year. Note investment figures exclude large-scale hydropower schemes.



Source: International Renewable Energy Agency (IRENA)

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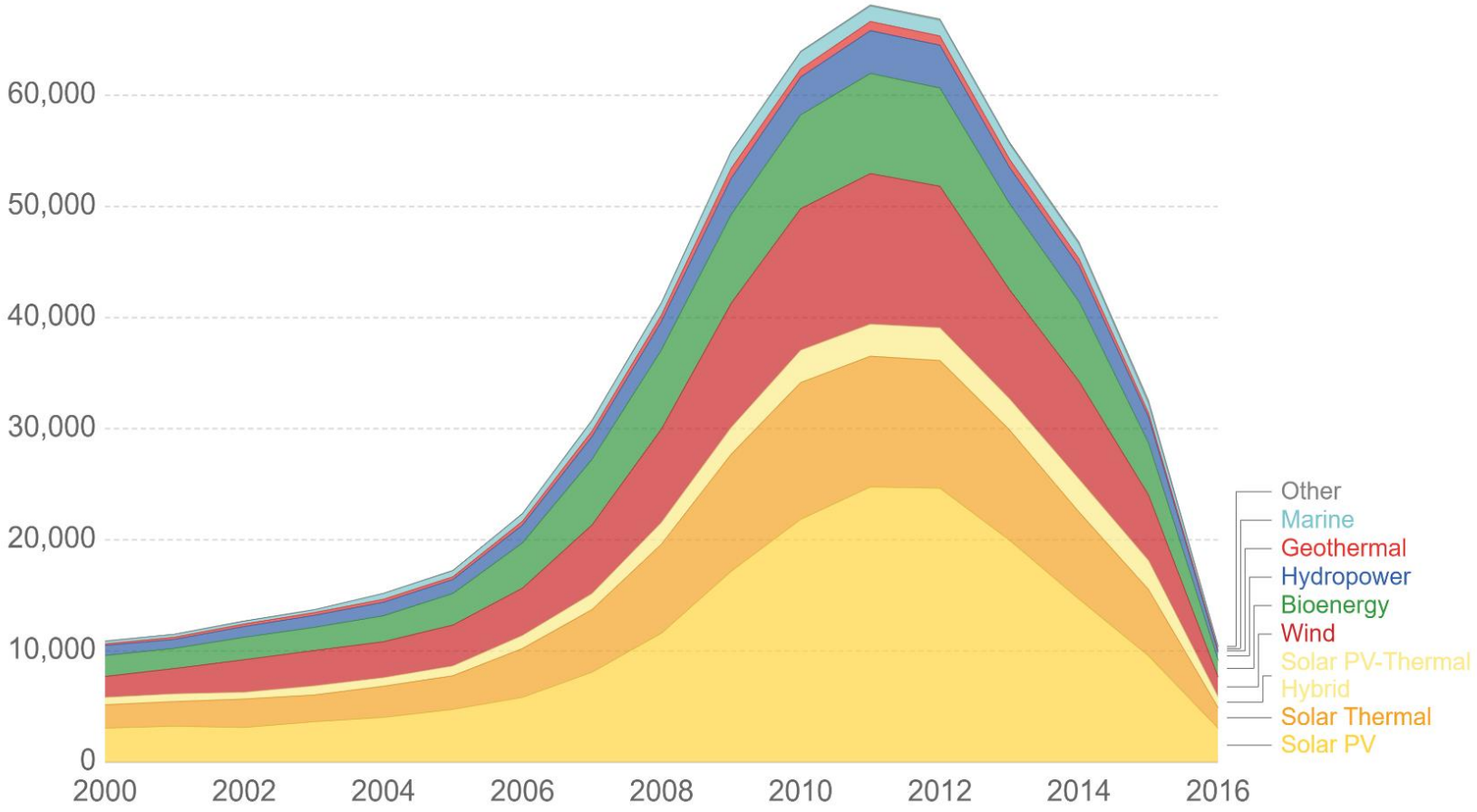
Number of patents filed for renewable energy technologies, World

Global number of patents filed under each renewable technology category per year. Note that figures for 2014-16 may be subject to a time lag; processing times of patent applications vary and some patents submitted over this period may not yet be recorded in statistics. These figures will be updated with time if additional patent applications are recorded.



Source: IRENA (& EPO PATSTAT)

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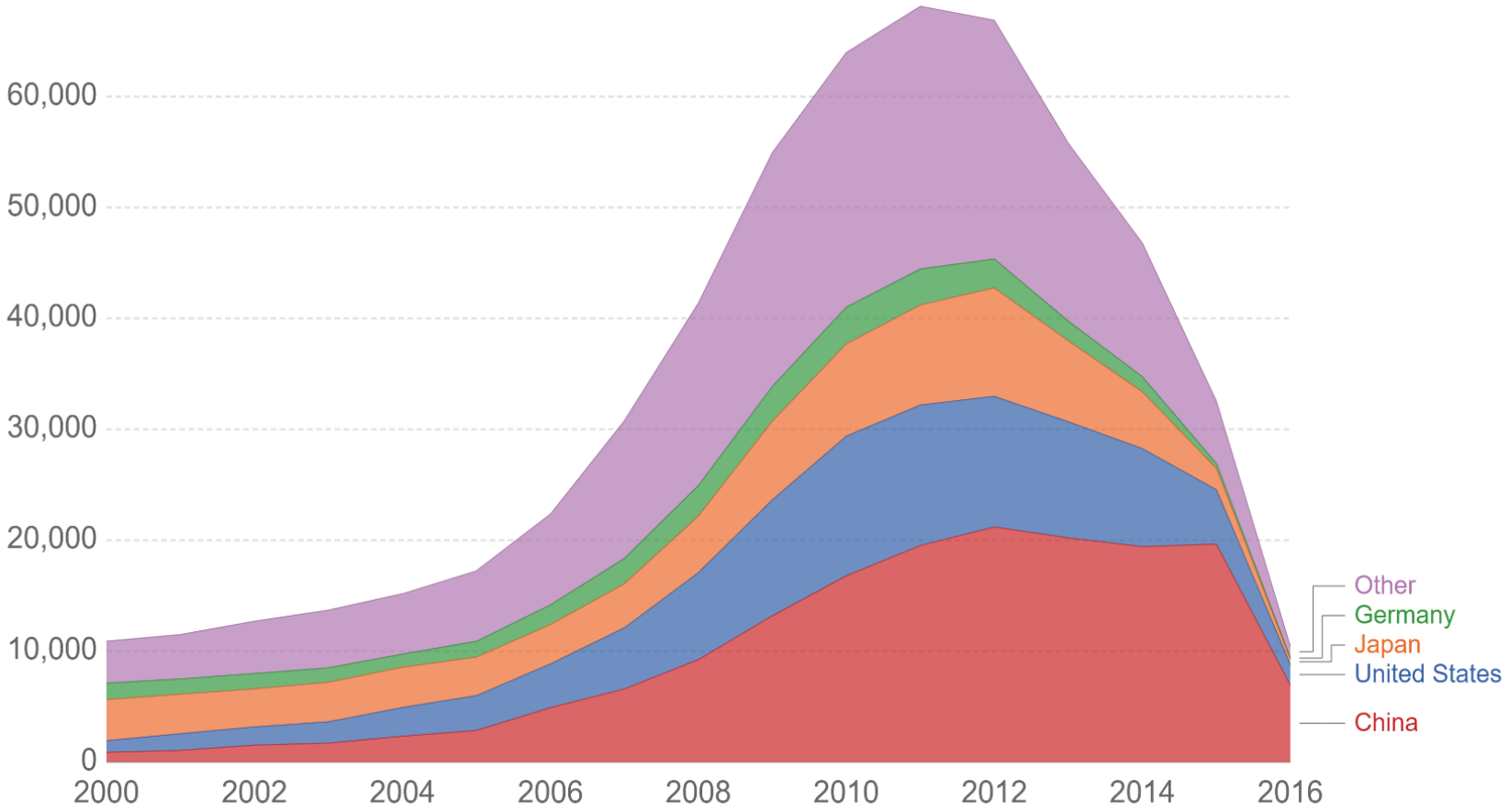
Number of patents filed for renewable energy technologies

Annual number of patents filed for innovations in renewable energy technologies, measured in key countries. This includes patents filed in wind, solar (PV and thermal), bioenergy, geothermal, marine, and hydropower. Note that figures for 2014-16 may be subject to a time lag; processing times of patent applications vary and some patents submitted over this period may not yet be recorded in statistics. These figures will be updated with time if additional patent applications are recorded.



Source: IRENA (& EPO PATSTAT)

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Renewable energy consumption vs. GDP per capita, 2014

Renewable energy as a share of total final energy consumption, versus gross domestic product (GDP) per capita, measured in 2011 international-$. Final energy consumption is inclusive of electricity, transport and cooking and heating. Traditional biomass is included as renewable energy - a primary energy source at low incomes.

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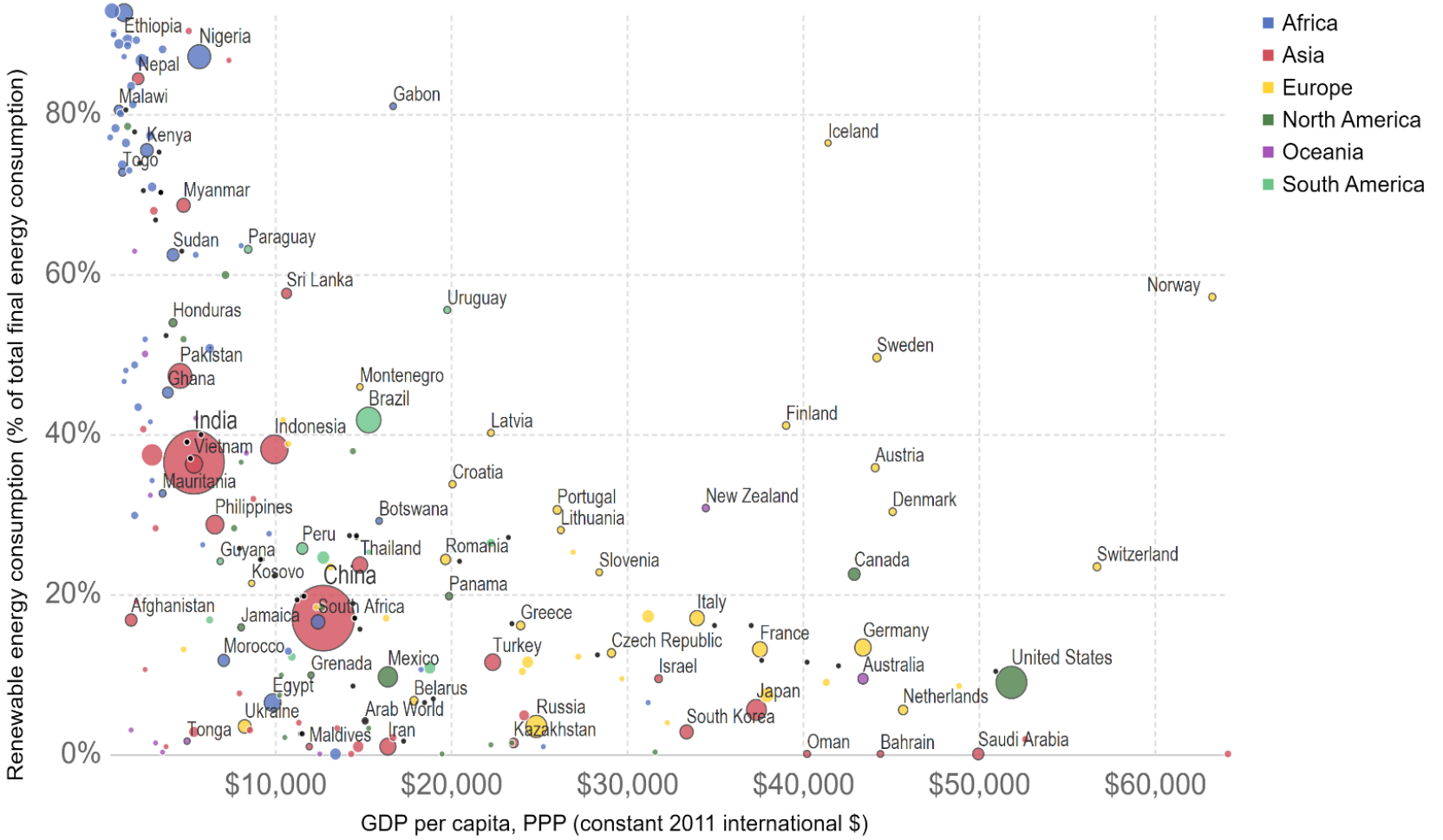

Source: World Bank, Sustainable Energy for All (SE4ALL)

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Wind energy consumption vs. installed wind energy capacity, 2016

Wind energy consumption, measured in gigawatt-hours (GWh) per year versus cumulative installed wind energy capacity, measured in gigawatts (GW). Data includes energy from both onshore and offshore wind sources.

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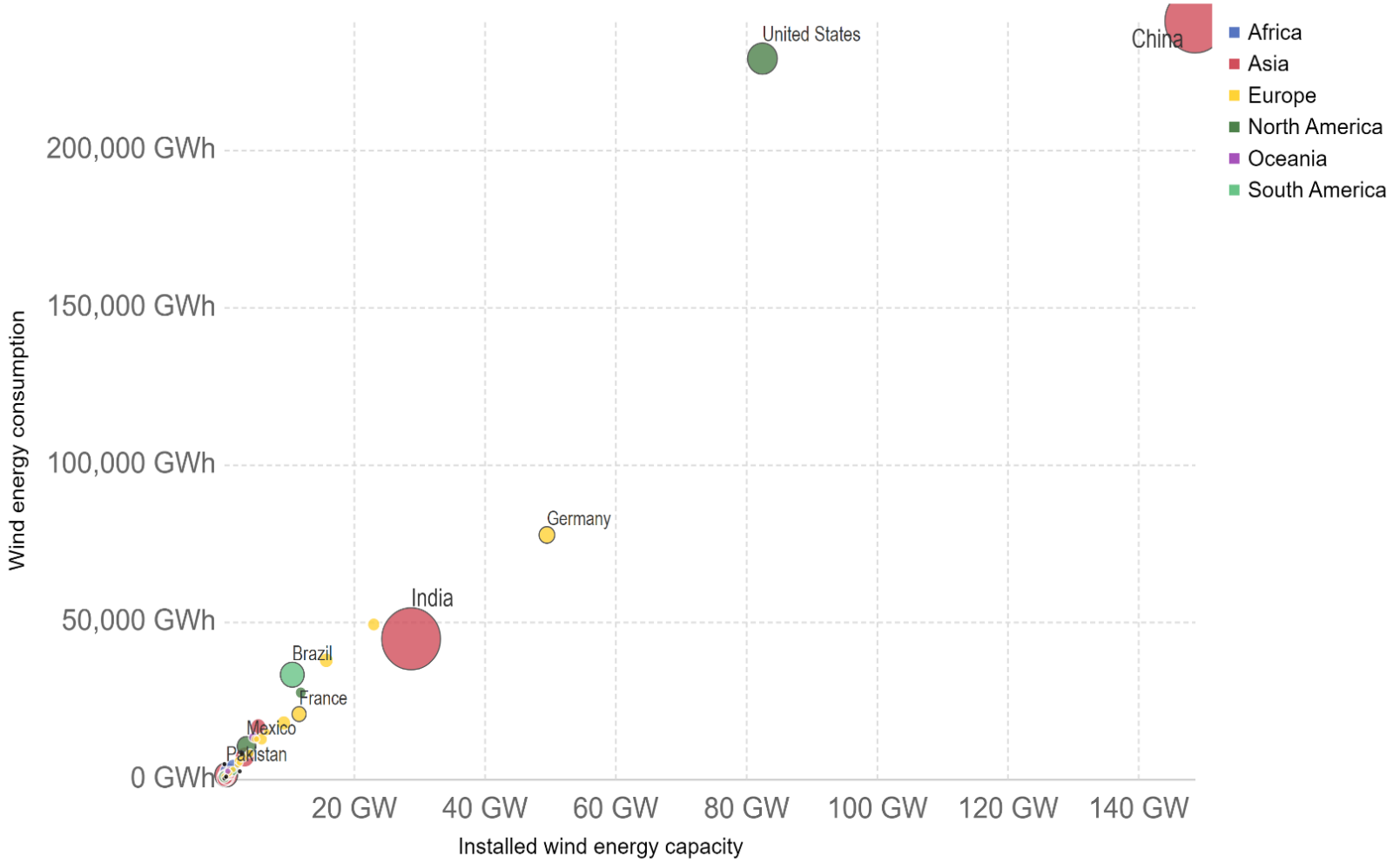

Source: BP Statistical Review of Global Energy

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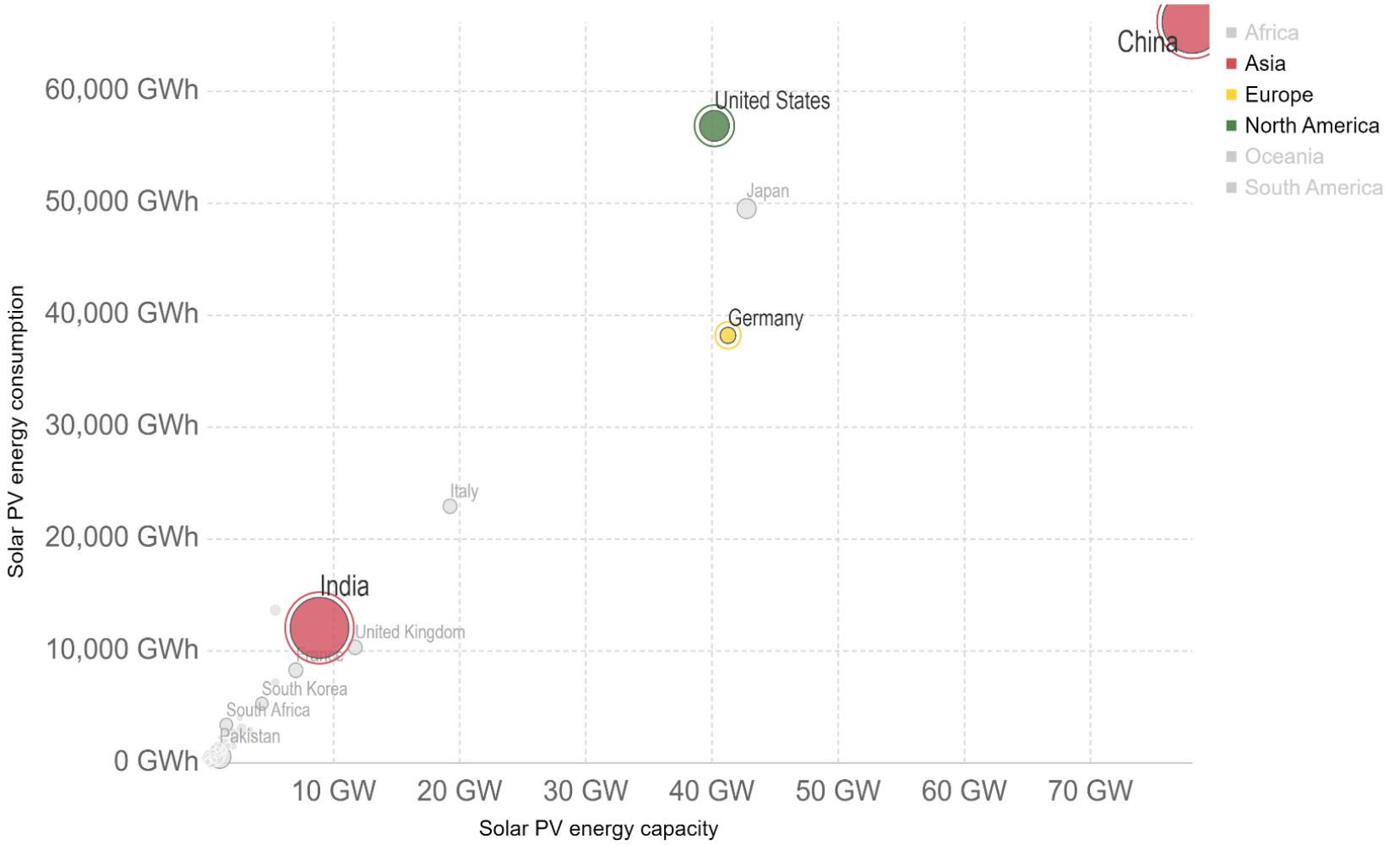
Solar PV energy consumption vs. solar PV capacity, 2016

Total annual solar photovoltaic (PV) energy consumption, measured in gigawatt-hours (GWh) per year versus installed solar PV capacity, measured in gigawatts (GW).

Our World in Data



Source: BP Statistical Review of Global Energy

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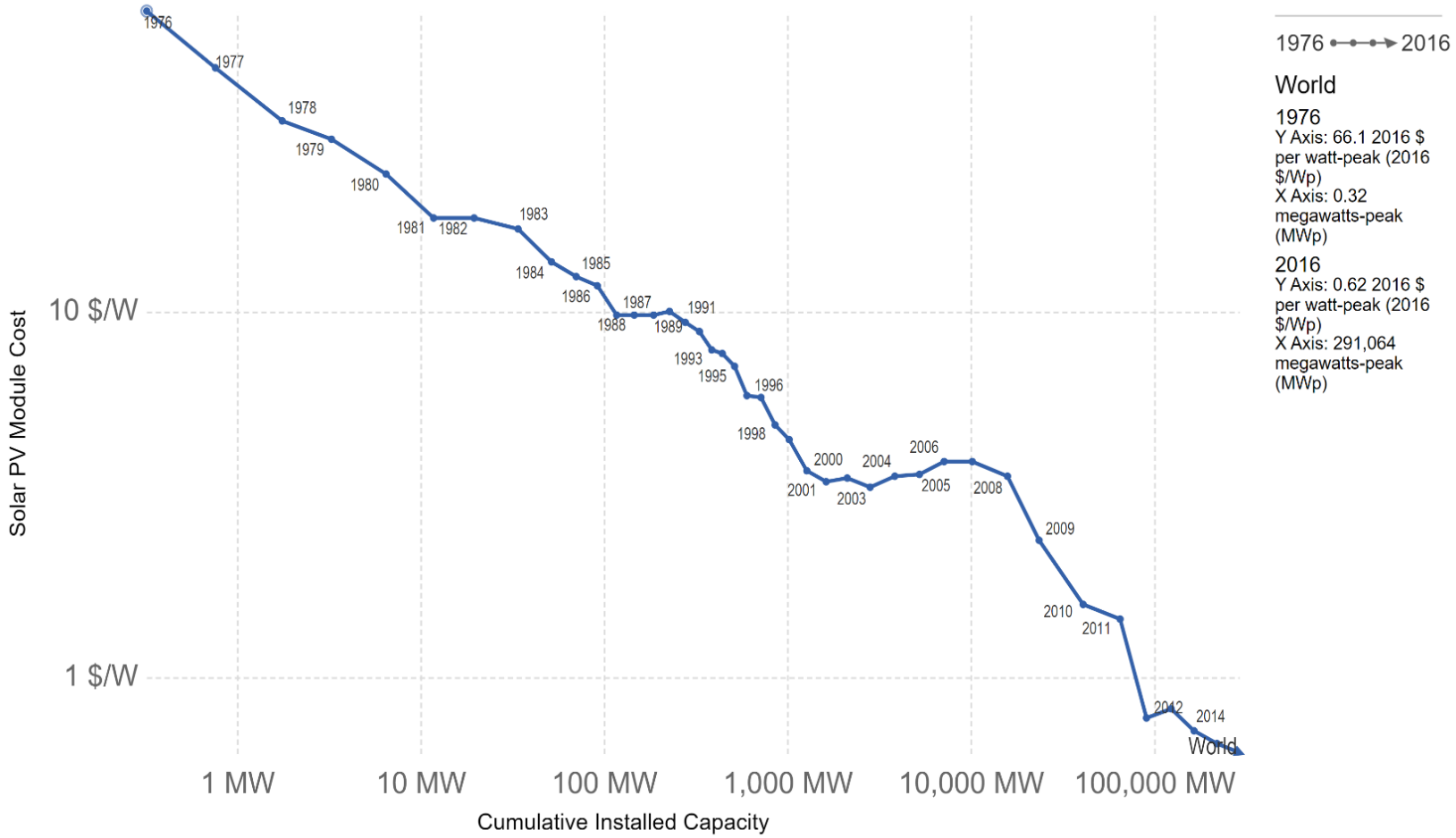
Solar PV prices vs. cumulative capacity, 1976 to 2016

Solar photovoltaic (PV) module prices (measured in 2016 US$ per watt-peak) versus cumulative installed capacity (measured in megawatts-peak, MWp). This represents the 'learning curve' for solar PV and approximates a 22% reduction in price for every doubling of cumulative capacity.



Source: Lafond et al. (2017); IRENA; SolarServer

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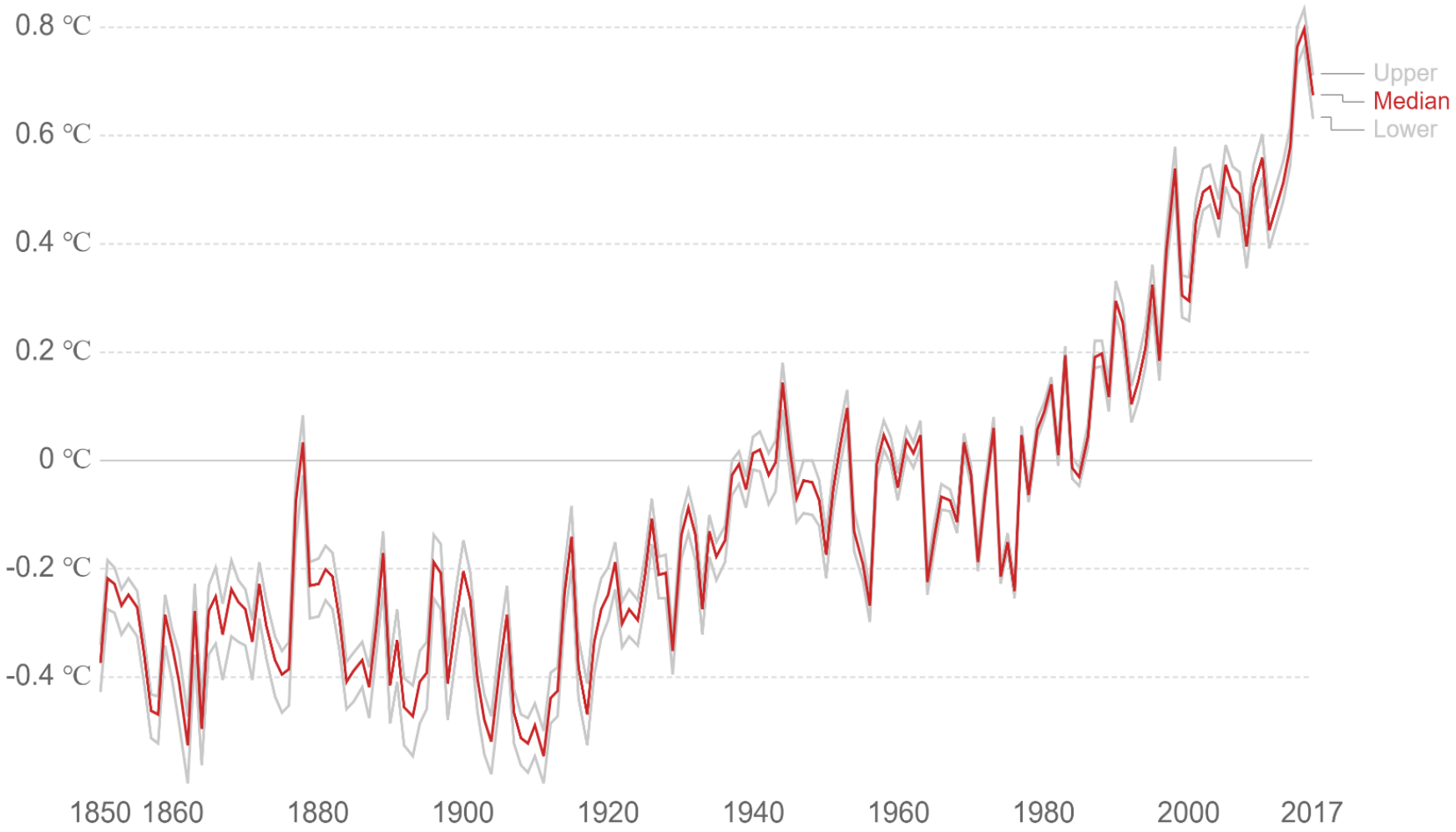
CO_2 and other greenhouse gases

Subtitle

Temperature anomaly from 1961-1990 average, Global

Global average land-sea temperature anomaly relative to the 1961-1990 average temperature in degrees celcius (°C). The red line represents the median average temperature change, and grey lines represent the upper and lower 95% confidence intervals.



Source: Hadley Centre (HadCRUT4)

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Cumulative CO_2 emissions, 2014

Cumulative carbon dioxide (CO_2) emissions represents the total sum of CO_2 emissions since 1751, and is measured in million tonnes.

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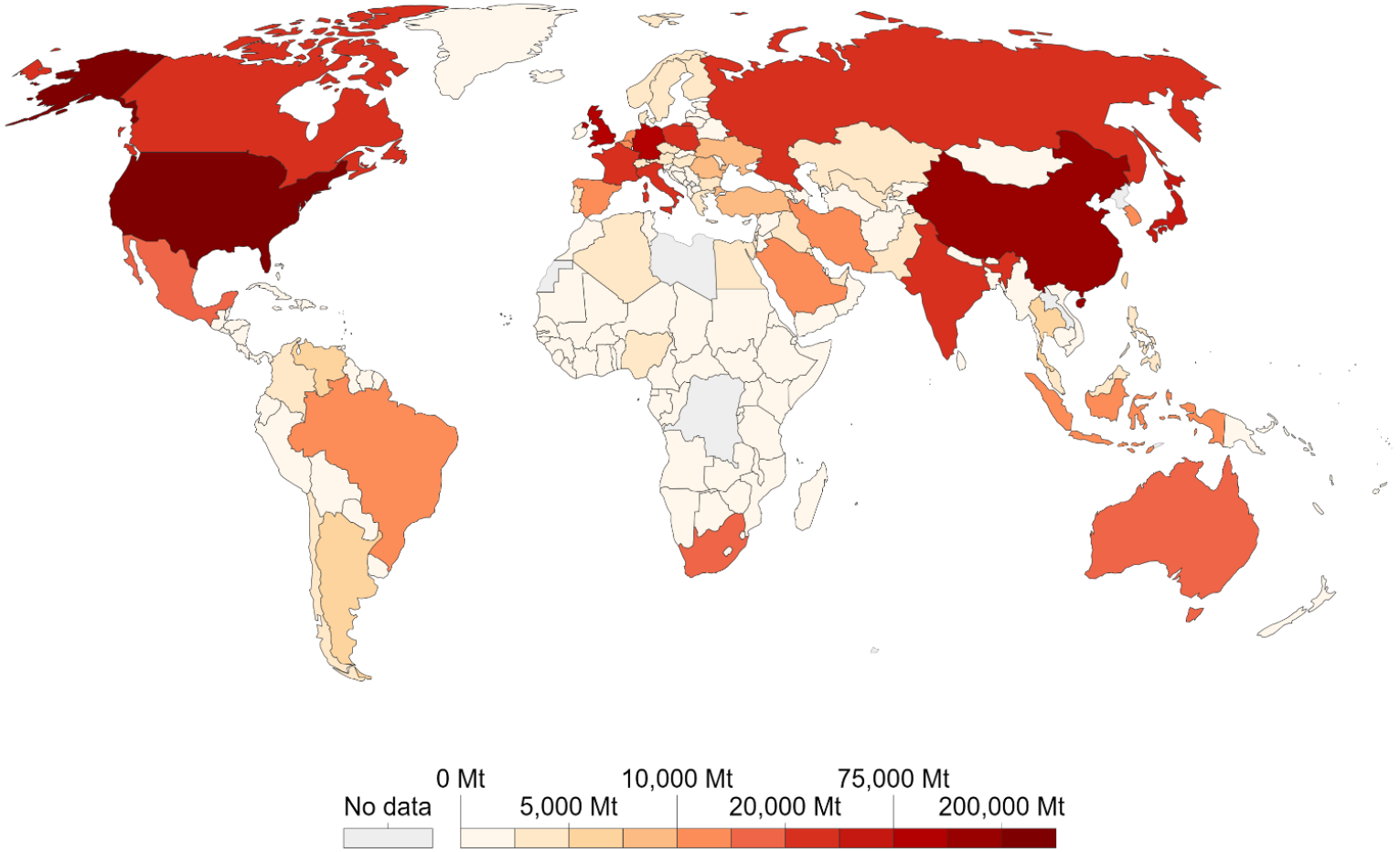

Source: Carbon Dioxide Information Analysis Centre (CDIAC)

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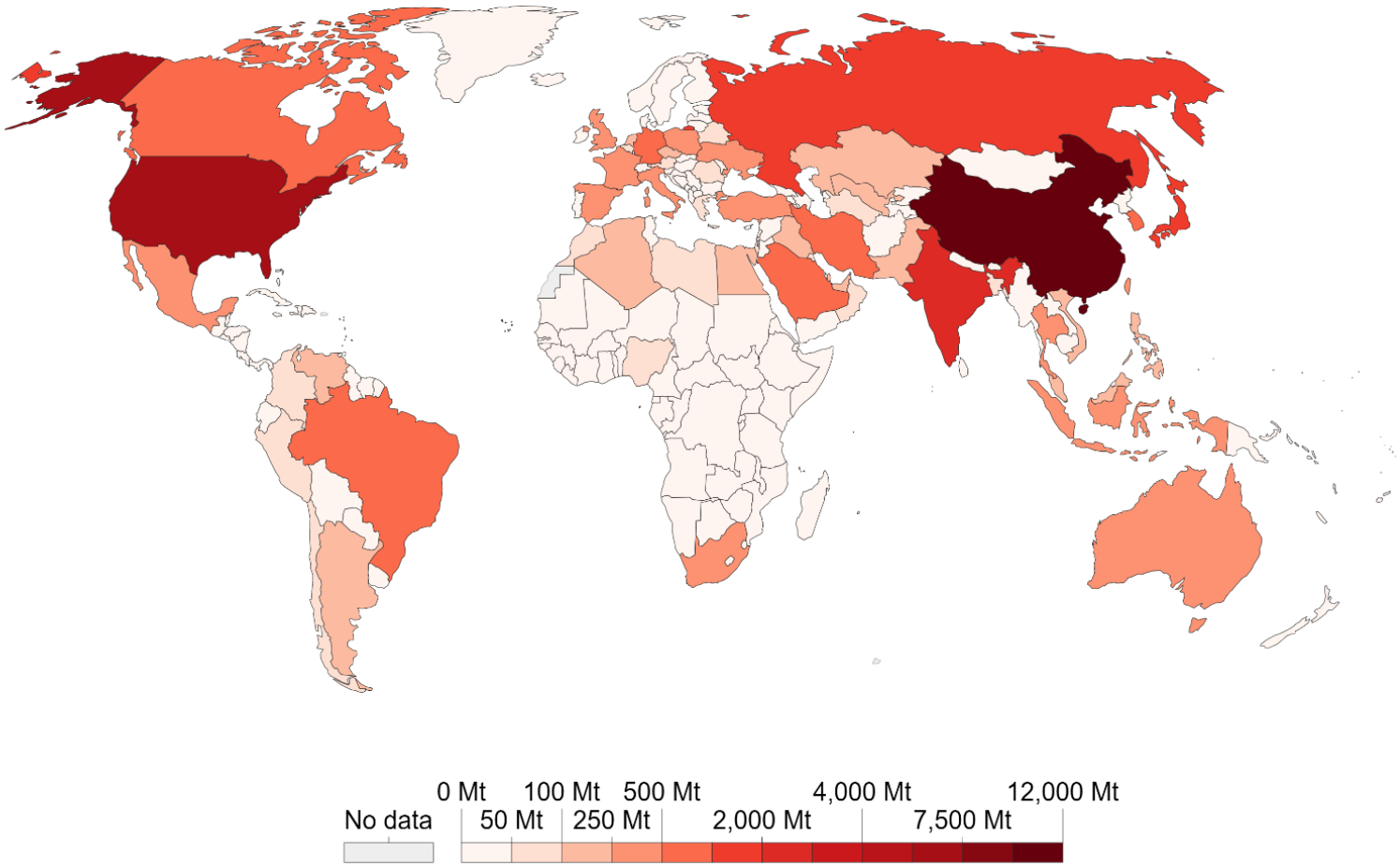
Annual CO_2 emissions, 2014

Annual carbon dioxide (CO_2) emissions, measured in million tonnes (Mt) per year.

Our World in Data



Source: Global Carbon Project; Carbon Dioxide Information Analysis Centre (CDIAC)
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CO_2 emissions per capita, 2016

Average carbon dioxide (CO_2) emissions per capita measured in tonnes per year.

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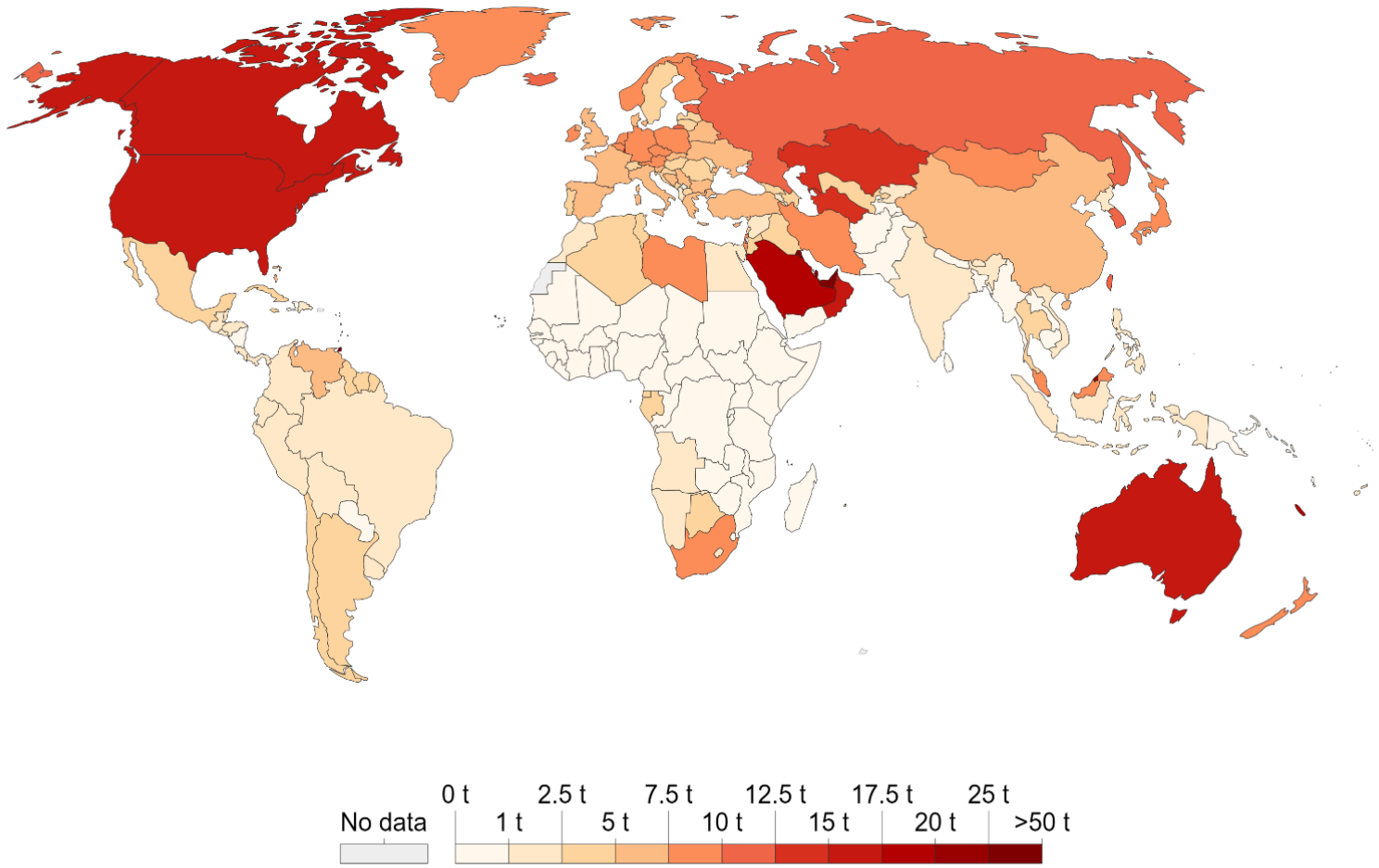

Source: OWID based on Global Carbon Project; Gapminder & UN

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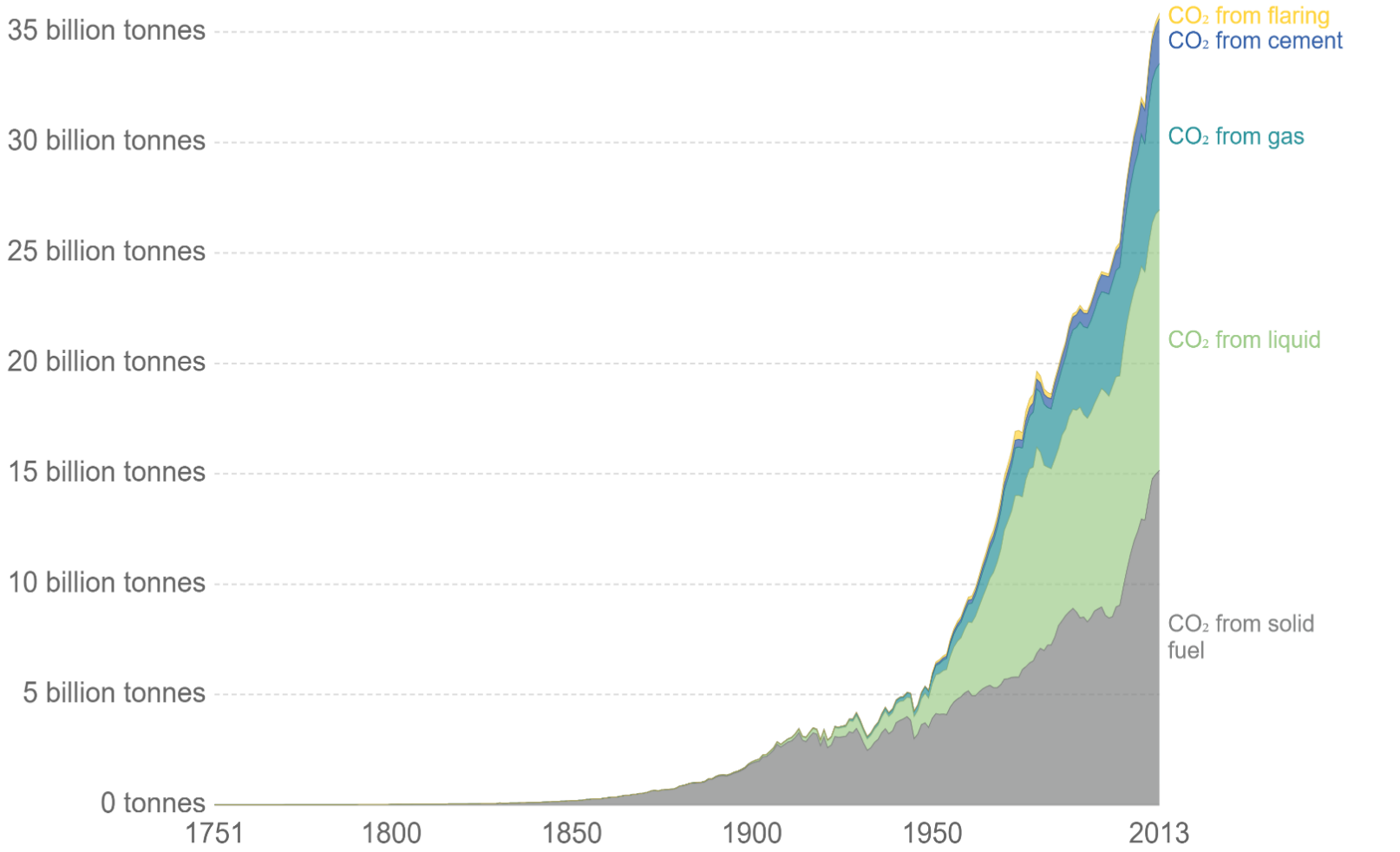
CO_2 emissions by source, World

Annual carbon dioxide (CO_2) emissions from solid fuel (e.g. coal); liquid (e.g. oil); gas (e.g. natural gas); cement production and gas flaring, measured in tonnes per year.



Source: CDIAC

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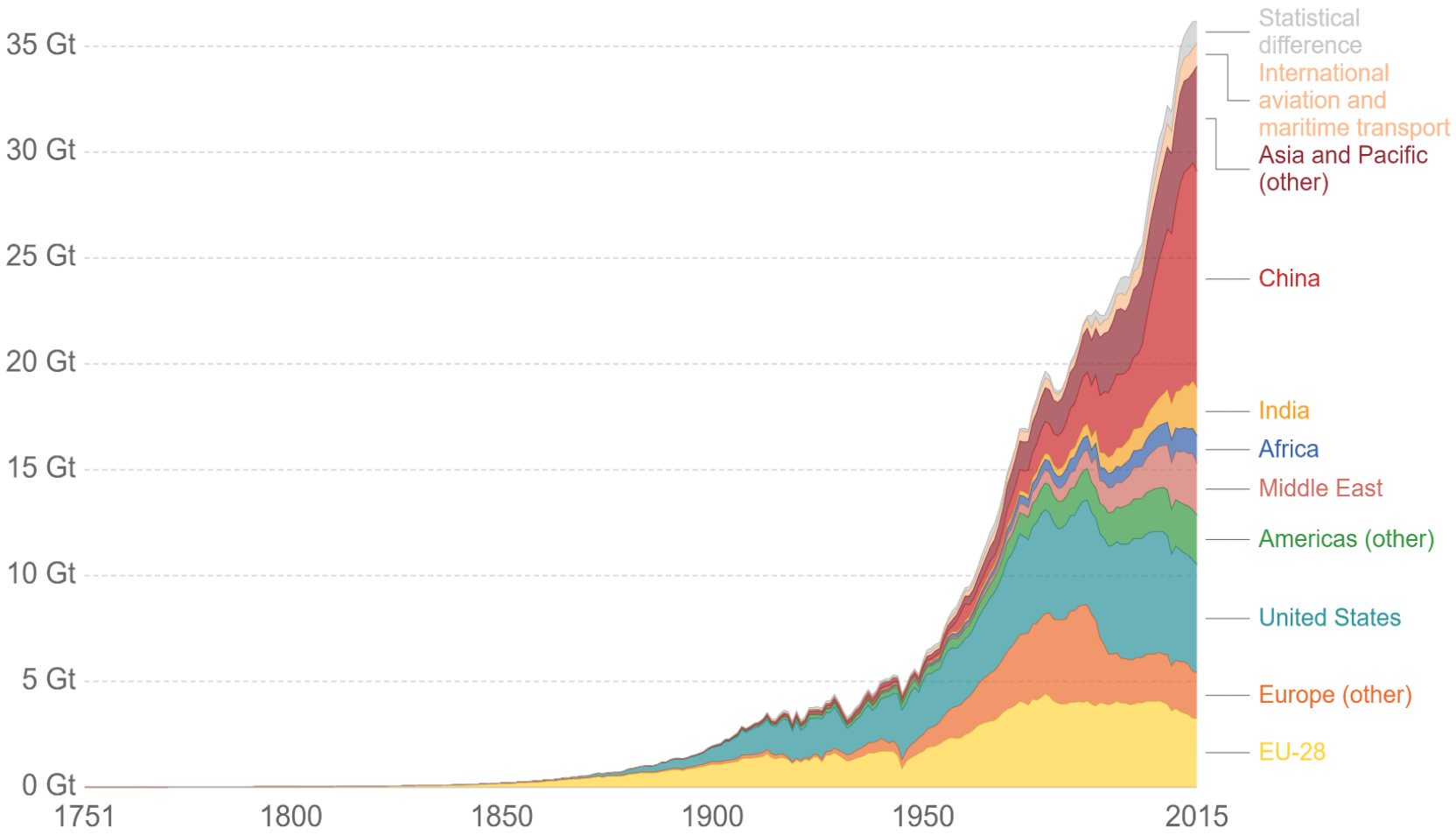
Annual CO_2 emissions by world region

Annual carbon dioxide (CO_2) emissions measured in billion tonnes (Gt) per year



Source: Carbon Dioxide Information Analysis Center (CDIAC)

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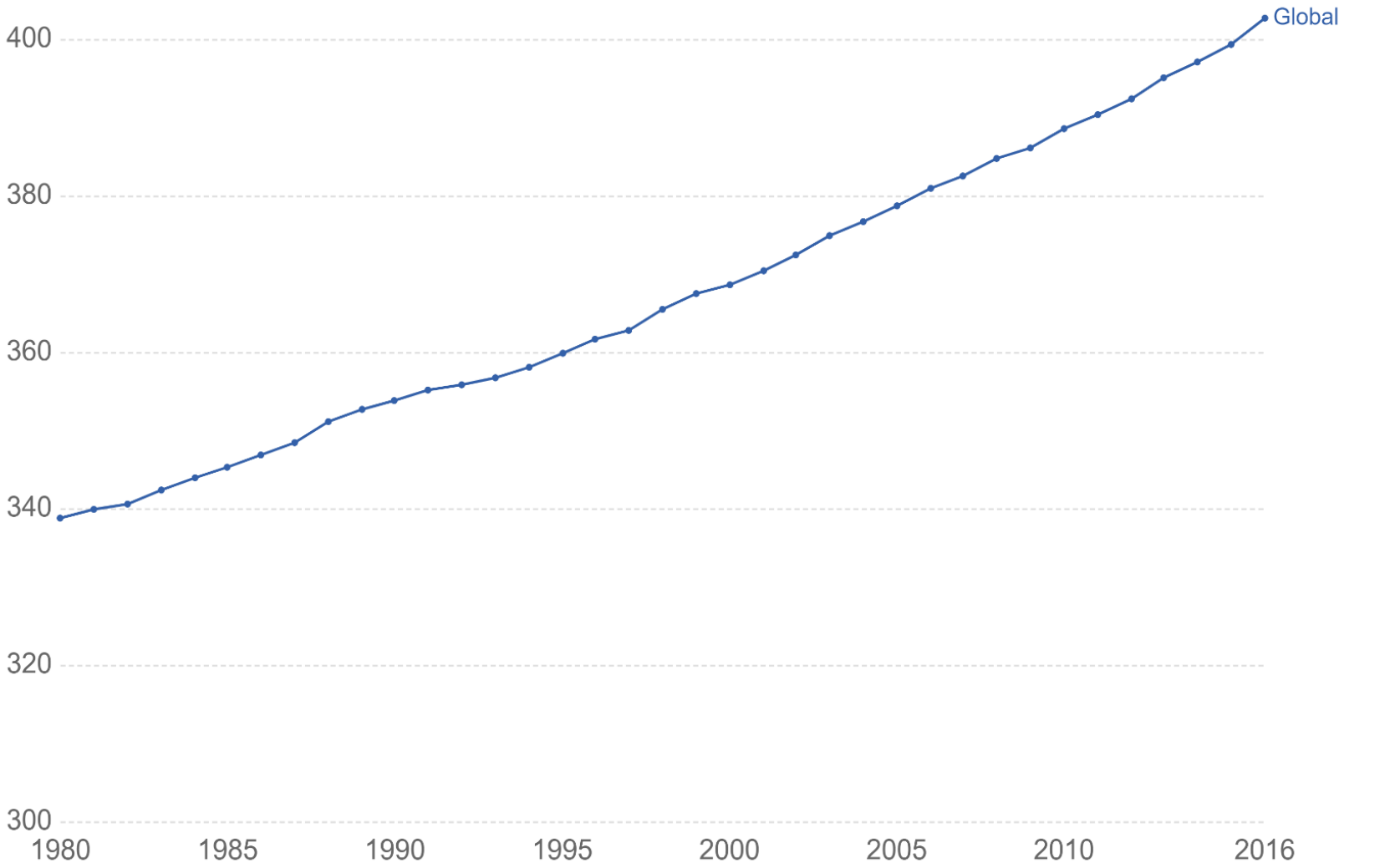
Note: Emissions data have been converted from units of carbon to carbon dioxide (CO2) using a conversion factor of 3.67. Regions denoted "other" are given as regional totals minus emissions from the EU-28, USA, China and India. Here, we have rephrased the general term "bunker (fuels)" as "international aviation and maritime transport" for clarity.

Global CO_2 concentration (ppm)

Global concentration of carbon dioxide (CO_2) measured in parts per million (ppm)



Source: NOAA

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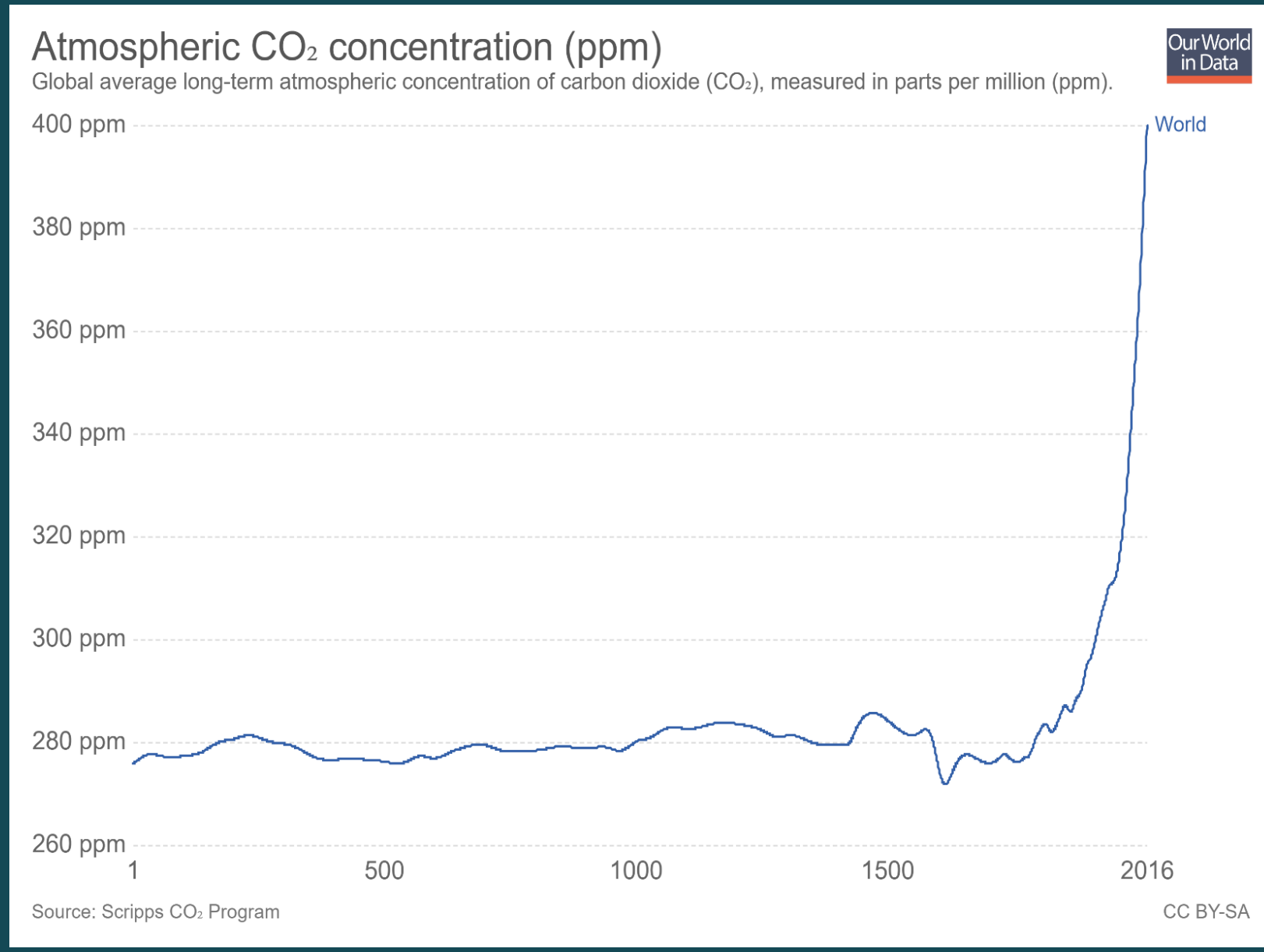
Atmospheric CO_2 concentration (ppm)
Global average long-term atmospheric concentration of carbon dioxide (CO_2), measured in parts per million (ppm).
Our World in Data
400 ppm
380 ppm
360 ppm
340 ppm
320 ppm
300 ppm
280 ppm
260 ppm
World
1
500
1000
1500
2016
Source: Scripps CO_2 Program
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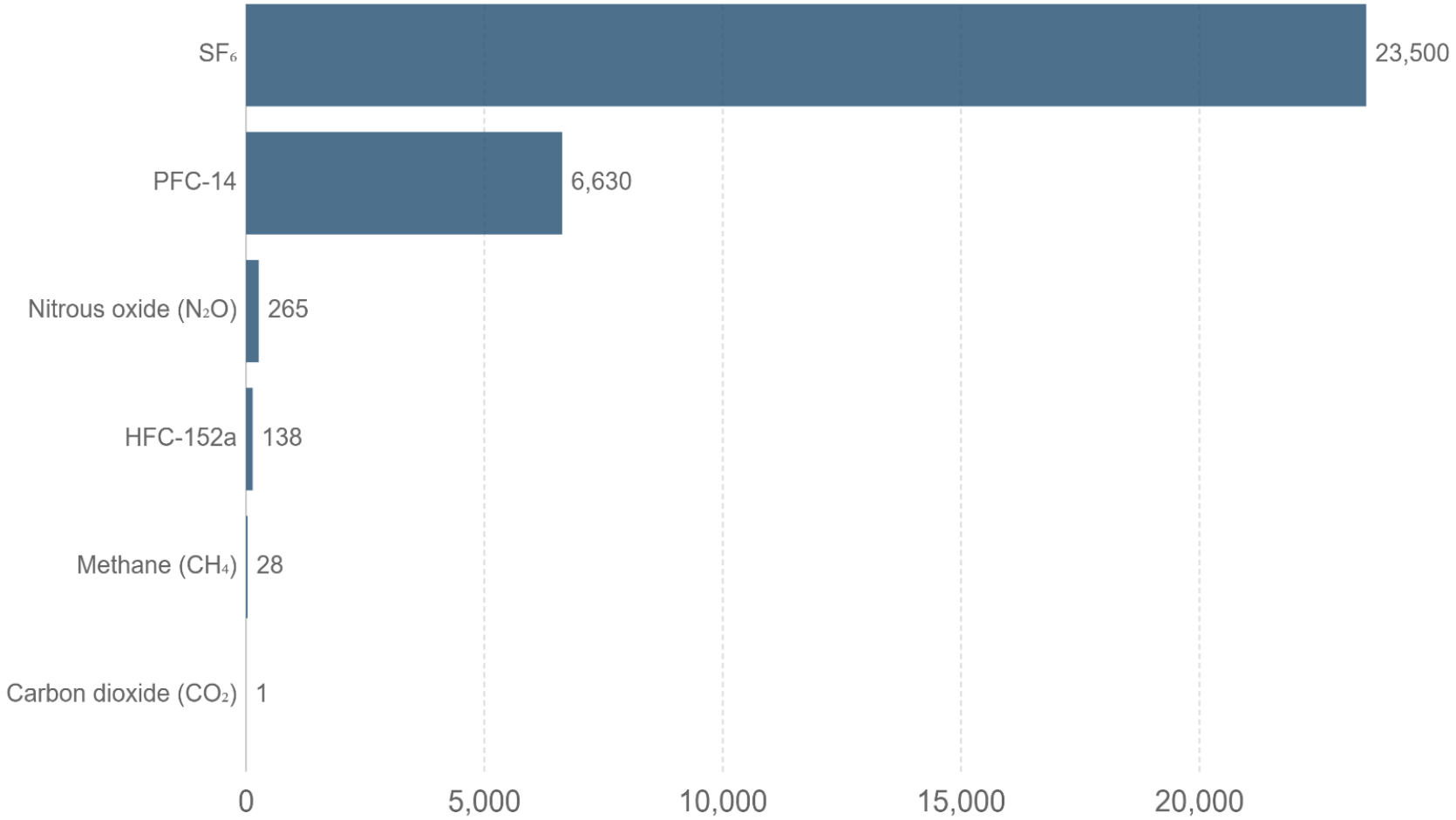
Global warming potential of greenhouse gases over 100-year timescale (GWP_{100})

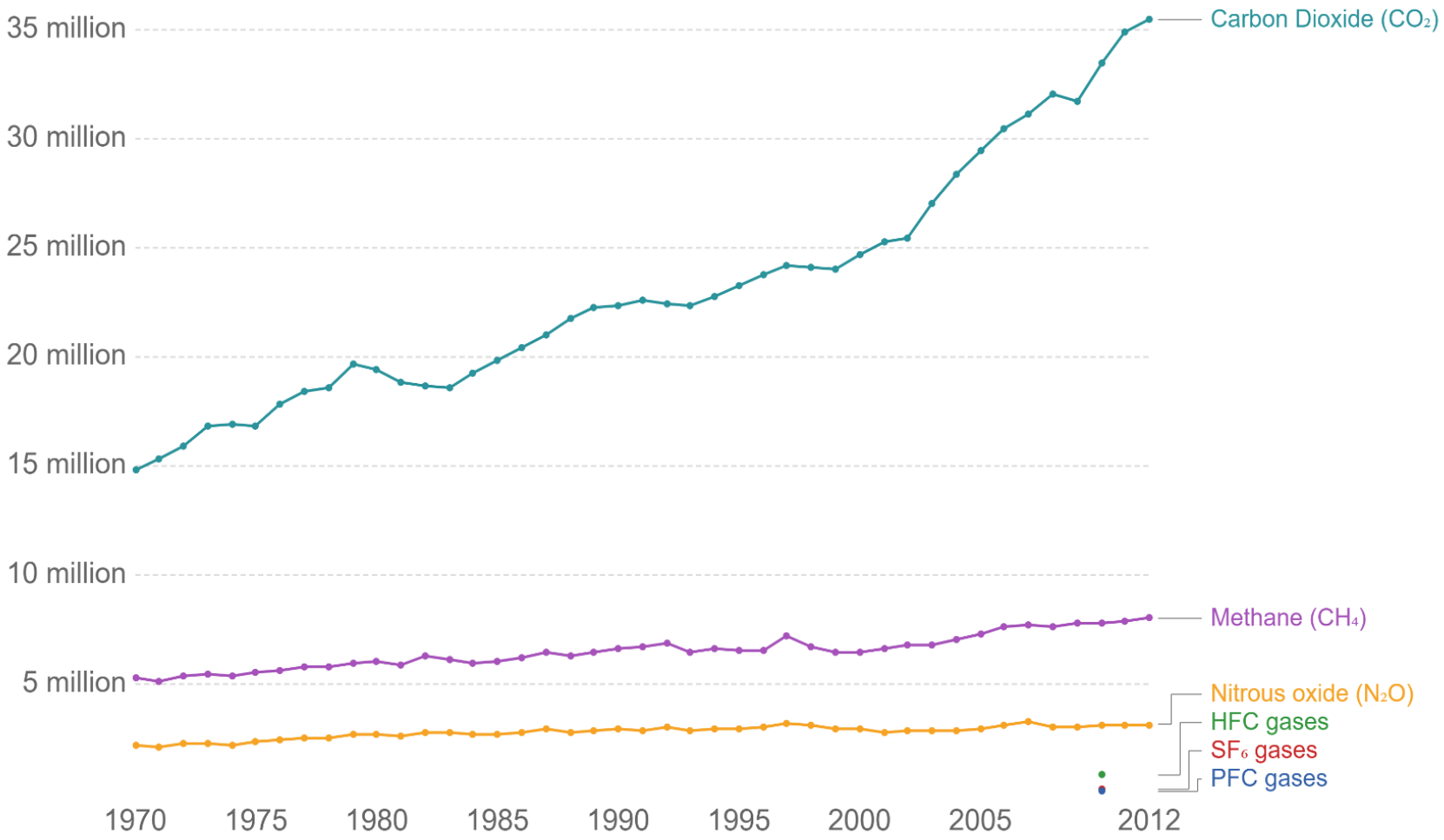
Global warming potential factors of greenhouse gases as measured over a 100-year timescale (GWP_{100}). GWP measures the relative warming impact of one unit mass of a greenhouse gas relative to carbon dioxide. A GWP_{100} value of 28 therefore means one tonne of methane has 28 times the warming impact of one tonne of carbon dioxide over a 100-year timescale.



Source: Global warming potential factors (GWP100) - IPCC (2014) OurWorldInData.org/co2-and-other-greenhouse-gas-emissions/ • CC BY-SA

Greenhouse gas emissions (CO_2e) by gas, World

Global greenhouse gas emissions by gas source, measured in thousand tonnes of carbon dioxide equivalents (kt CO_2e). Gases are converted to their CO_2e values based on their global warming potential factors. HFC, PFC and SF_6 are collectively known as 'F-gases'.



Source: World Bank - World Development Indicators (WDI)

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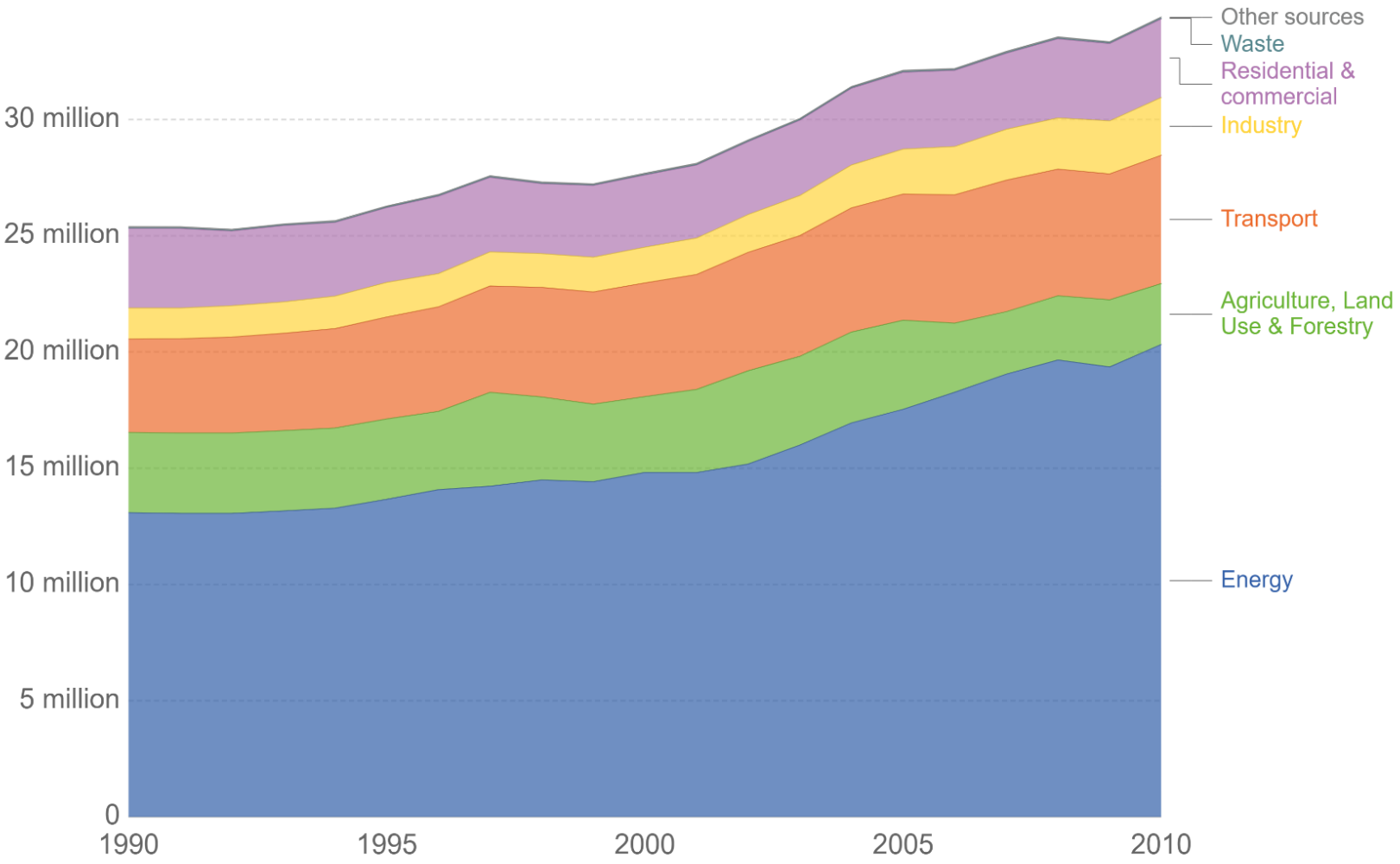
Global carbon dioxide emissions by sector (Gg CO_2)

Global carbon dioxide (CO_2) emissions, measured in gigagrams of CO_2 per year.



Source: UN Food and Agricultural Organization (FAO)

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Methane emissions by sector (Gg CO_2e)

Breakdown of total global methane (CH_4) emissions by sector, measured in gigagrams of carbon-dioxide equivalents (CO_2e). Carbon dioxide equivalents measures the total greenhouse gas potential of the full combination of gases, weighted by their relative warming impacts.

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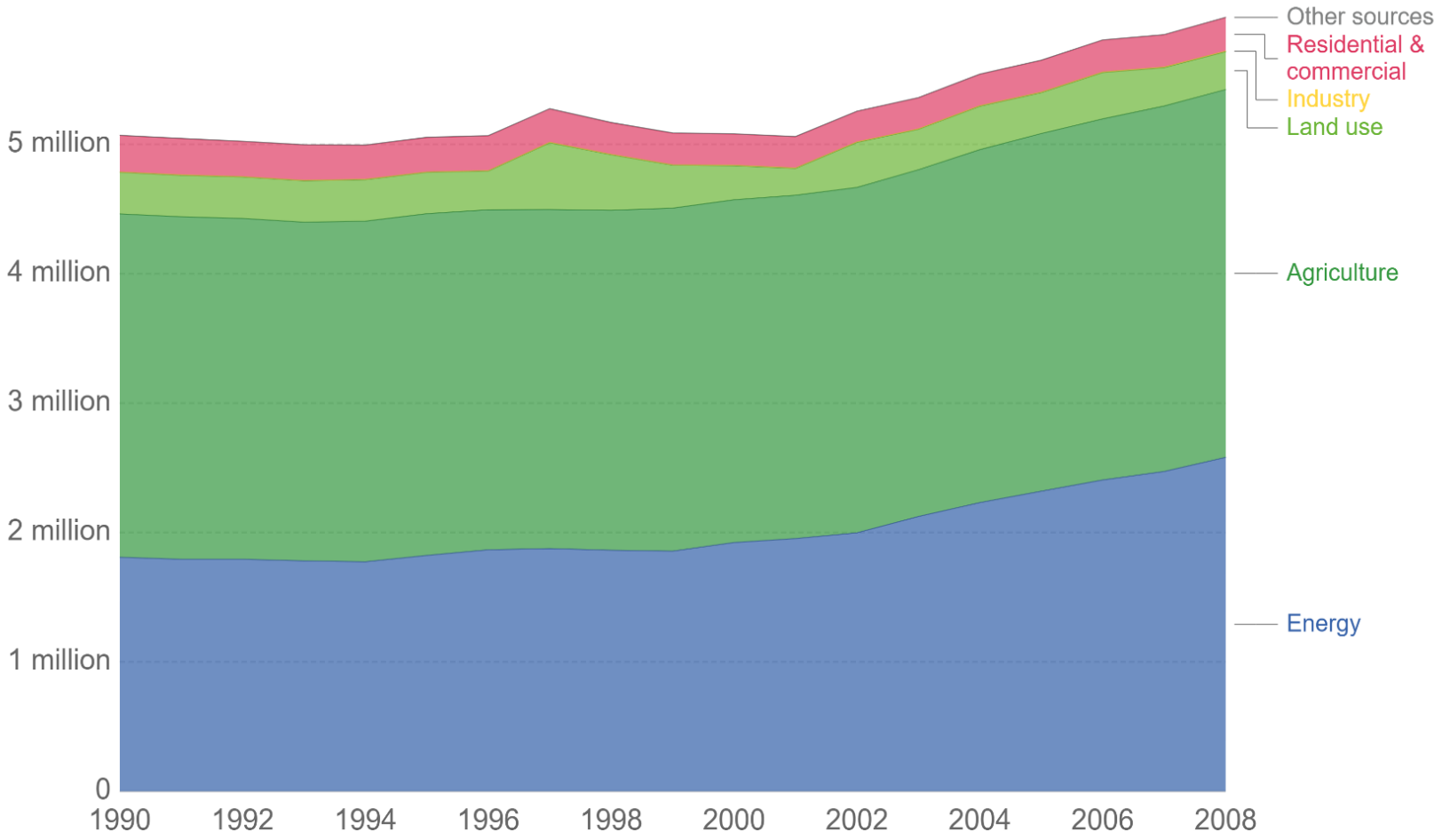

Source: UN Food and Agricultural Organization (FAO)

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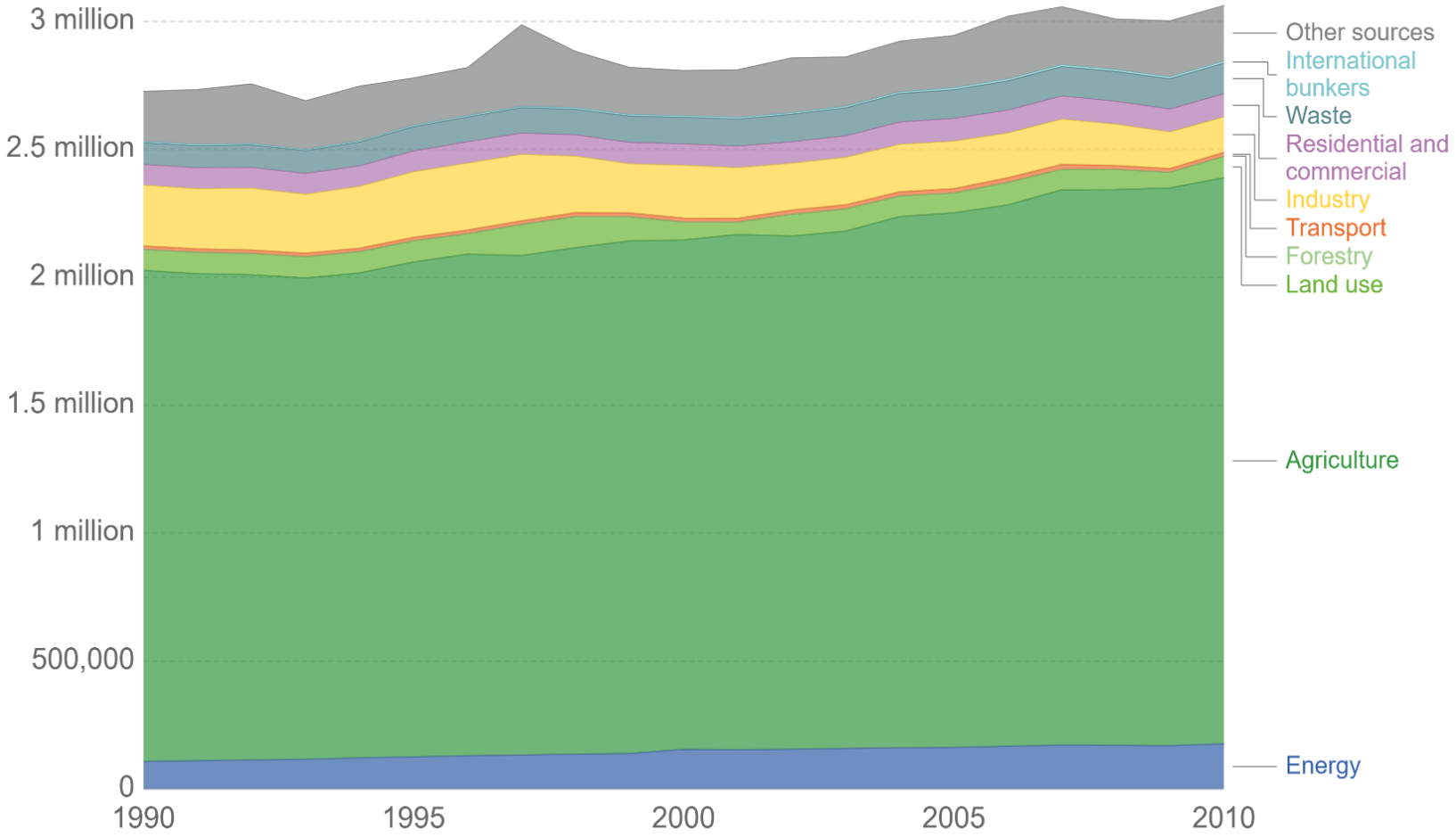
Nitrous oxide emissions by sector (Gg CO_2e), World

Breakdown of total global nitrous oxide (N_2O) emissions by sector, measured in gigagrams of carbon-dioxide equivalents (CO_2e). Carbon dioxide equivalents measures the total greenhouse gas potential of the full combination of gases, weighted by their relative warming impacts.

Our World in Data



Source: UN Food and Agricultural Organization (FAO)

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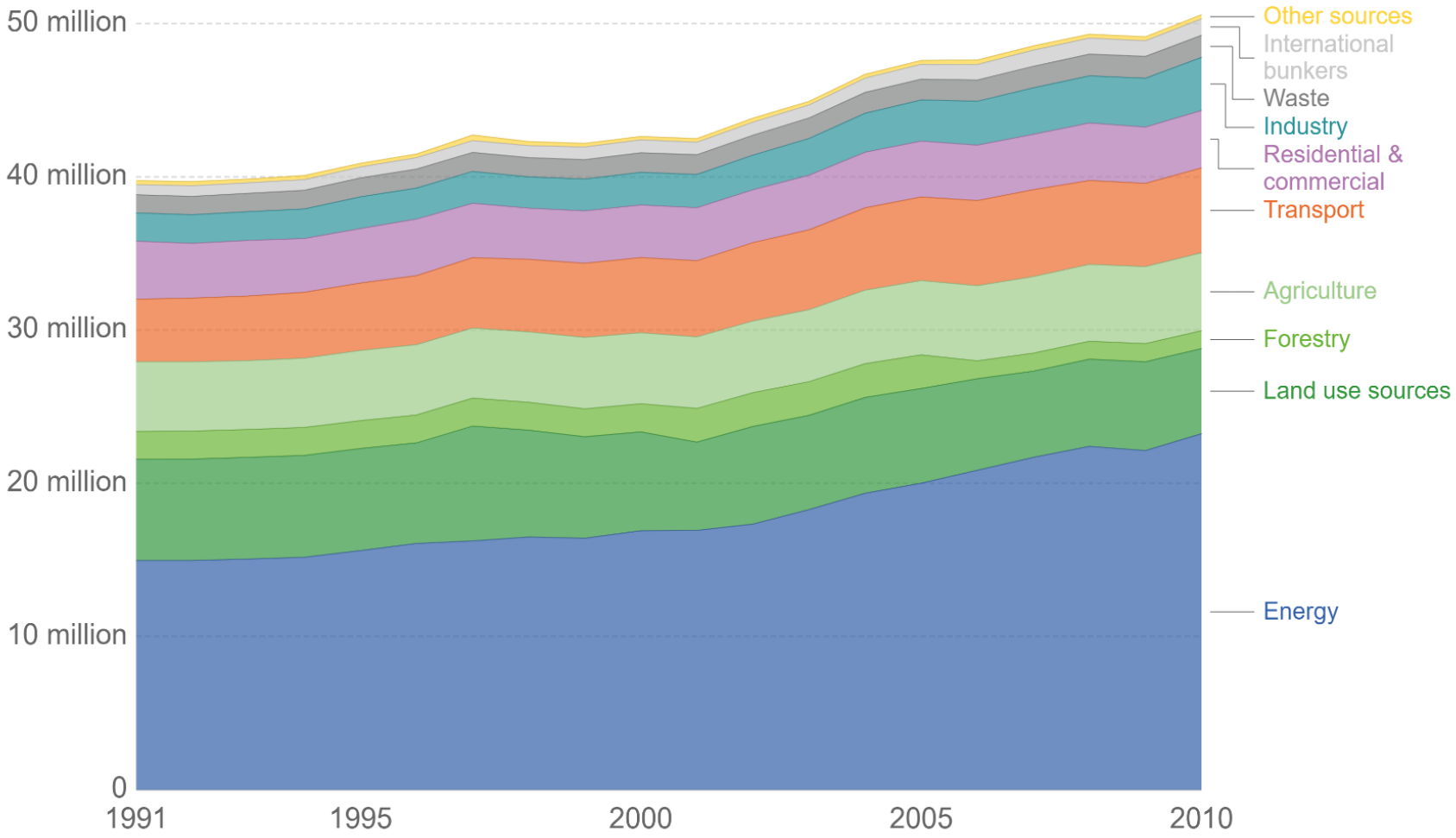
Global greenhouse gas emissions (CO_2e) by sector

Breakdown of total global greenhouse gas emissions by sector, measured in gigagrams of carbon-dioxide equivalents (CO_2e). Carbon dioxide equivalents measures the total greenhouse gas potential of the full combination of gases, weighted by their relative warming impacts.

Our World in Data



Source: UN Food and Agricultural Organization (FAO)

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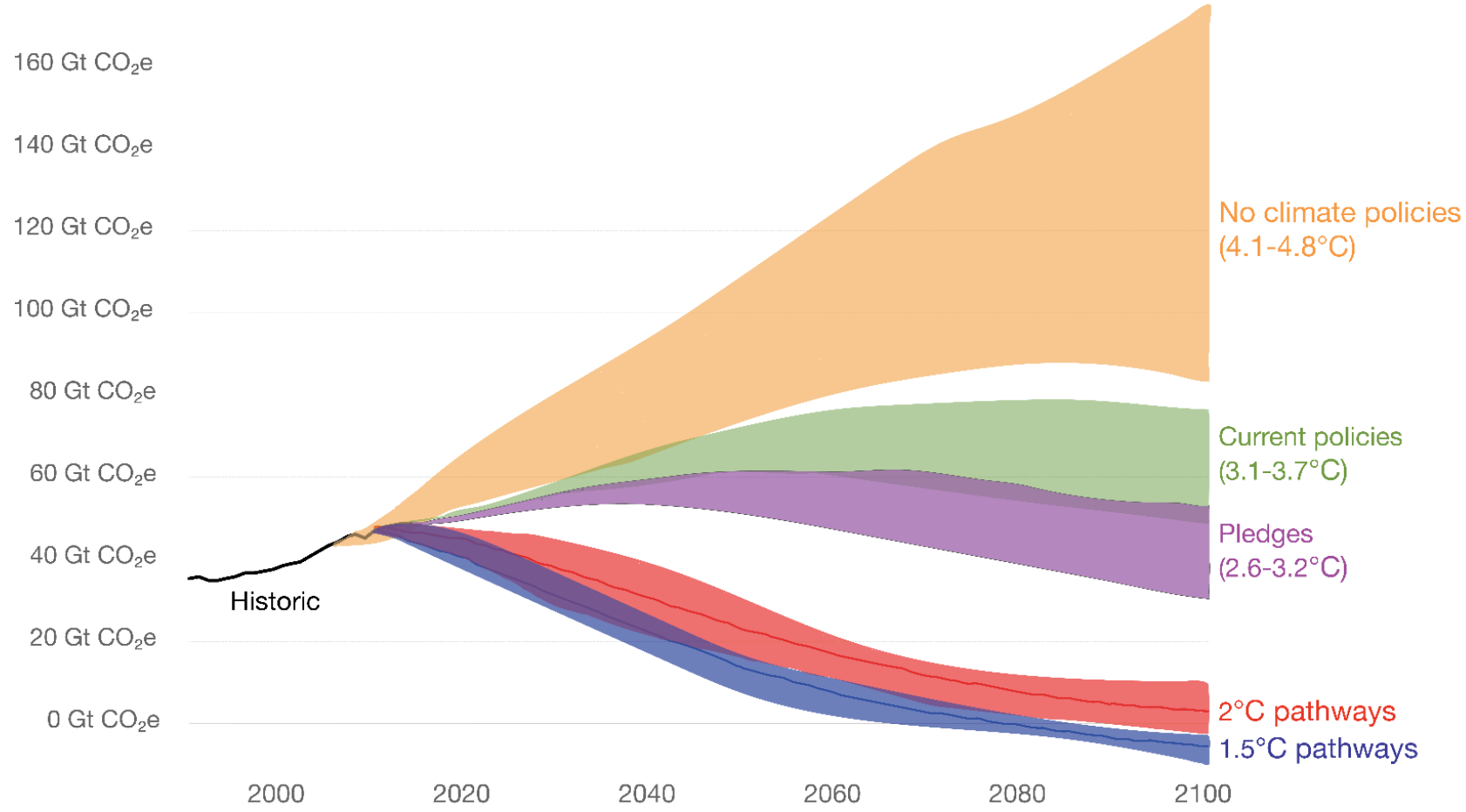
Global greenhouse gas emissions scenarios

Potential future emissions pathways of global greenhouse gas emissions (measured in gigatonnes of carbon dioxide equivalents) in the case of no climate policies, current implemented policies, national pledges within the Paris Agreement, and 2°C and 1.5°C consistent pathways. High, median and low pathways represent ranges for a given scenario. Temperature figures represent the estimated average global temperature increase from pre-industrial, by 2100.



Based on data from the Climate Action Tracker (CAT).
The data visualization is available at OurWorldinData.org. There you find research and more visualizations on this topic.

Licensed under CC-BY-SA by the authors Hannah Ritchie and Max Roser.

CO_2 emissions per capita vs GDP per capita, 2014

Carbon dioxide (CO_2) emissions per capita, measured in tonnes per person per year, versus gross domestic product (GDP) per capita, measured in 2011 international-$.

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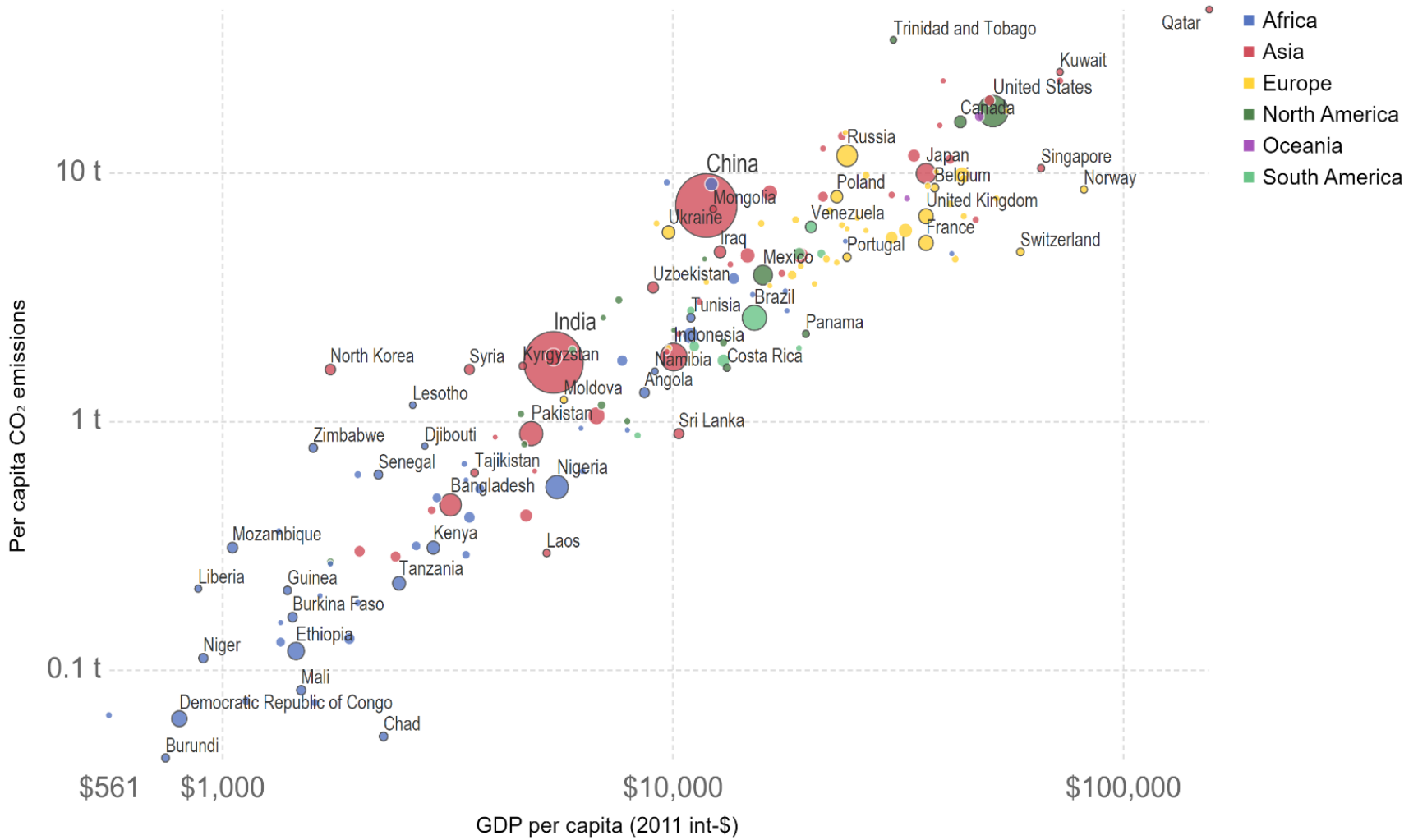

Source: Global Carbon Project, Maddison (2017)

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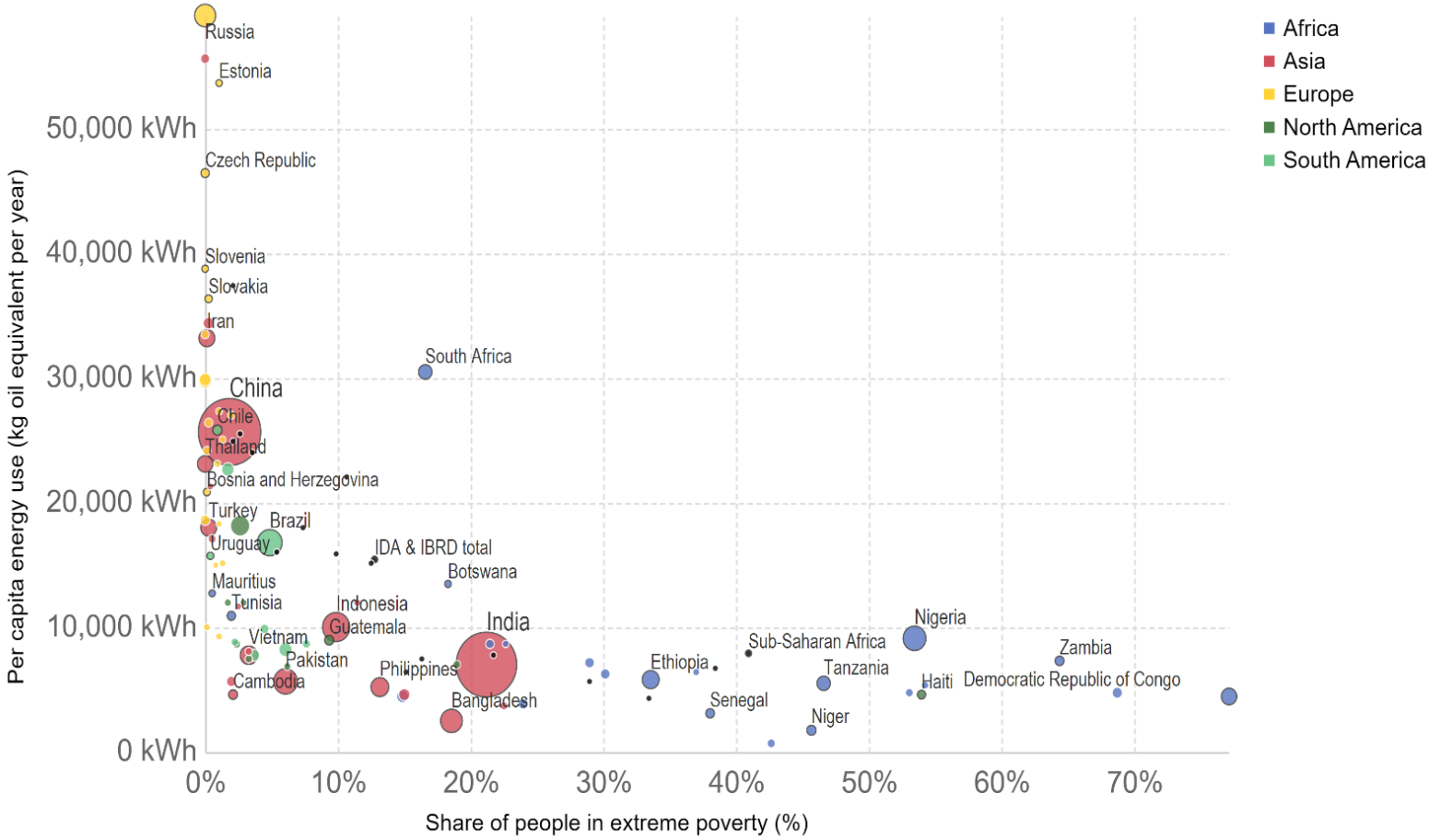
Energy use per capita vs. share of population in extreme poverty, 2013

Per capita energy use measured in kilowatt-hours (kWh) per year. Extreme poverty is defined as living at a consumption (or income) level below 1.90 "international-$" per day. International $ are adjusted for price differences between countries and price changes over time (inflation).

Our World in Data



Source: International Energy Agency (IEA) via The World Bank

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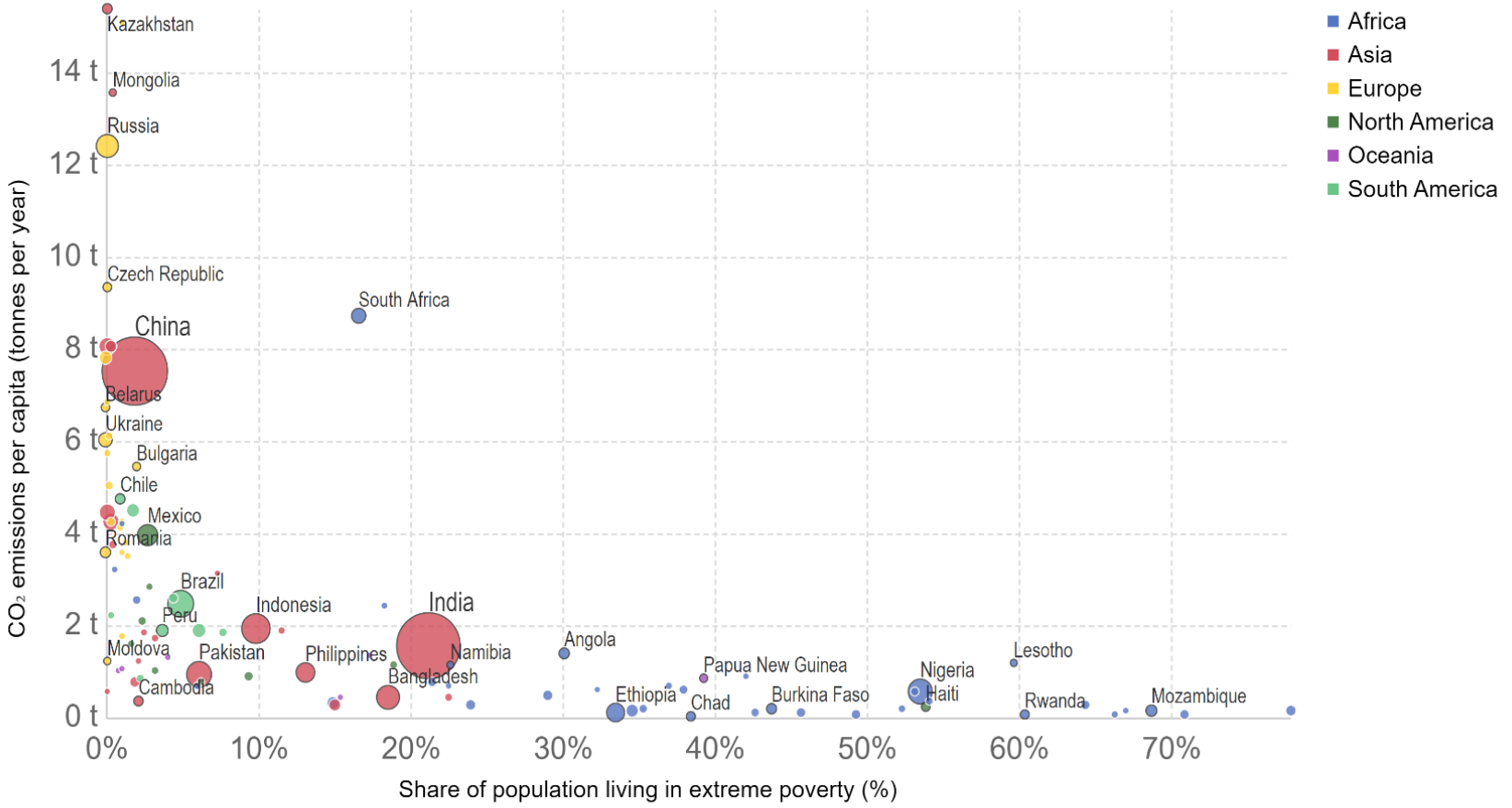
CO_2 emissions per capita vs. the share of people living in extreme poverty, 2013

Our World in Data

Average CO_2 emissions per capita are measured in tonnes per year. Extreme poverty is defined as living at a consumption (or income) level below 1.90 "international-$" per day. International $ are adjusted for price differences between countries and price changes over time (inflation).



Source: World Bank – WDI, CO2 emissions per capita by nation - CDIAC (2017)
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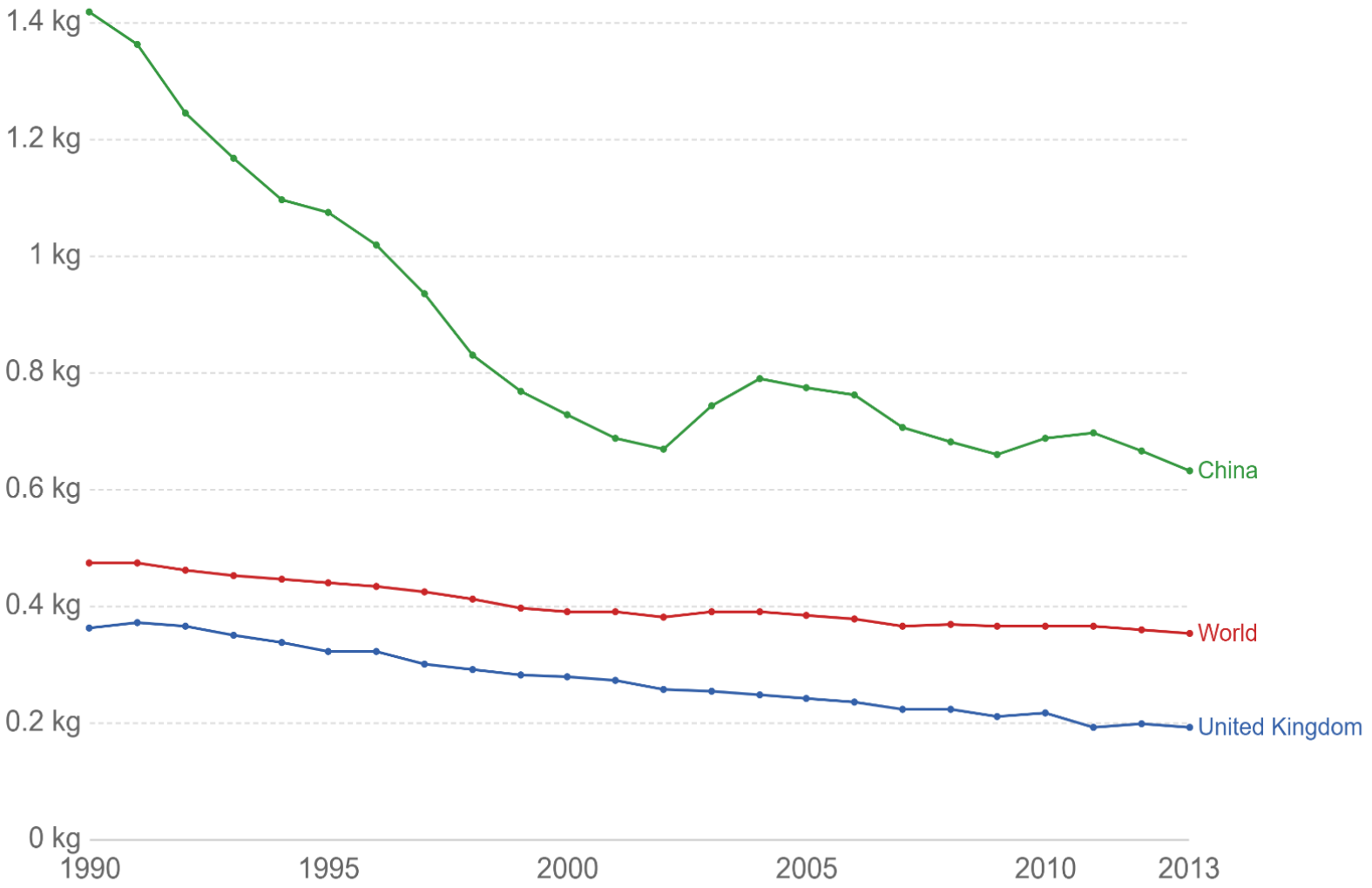
Carbon emission intensity of economies

Carbon dioxide (CO_2) intensity of economies measured in kilograms of CO_2 per unit GDP (2011 international-$).



Source: World Bank – WDI

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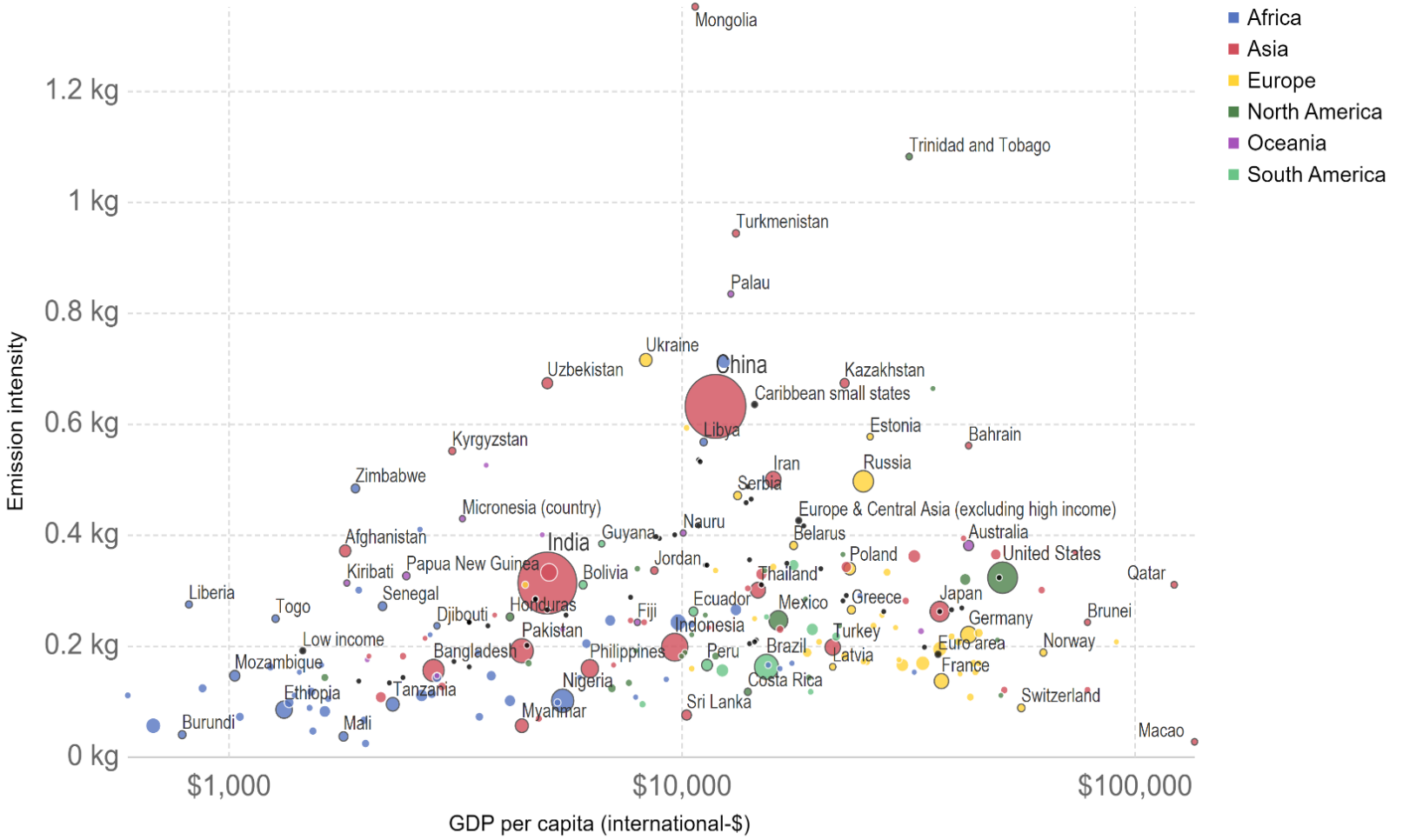
Carbon emission intensity vs GDP per capita, 2013

Carbon emission intensity is the ratio between emissions of CO_2 (in kg) to the output of the economy (in international-$).



Source: World Bank – WDI

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CO_2 emissions in imported goods as a share of domestic emissions, 2014

Share of carbon dioxide (CO_2) emissions embedded in trade, measured as emissions exported or imported as the percentage of domestic production emissions. Positive values (red) represent net importers of CO_2 (i.e. "20%" would mean a country imported emissions equivalent to 20% of its domestic emissions). Negative values (blue) represent net exporters of CO_2.

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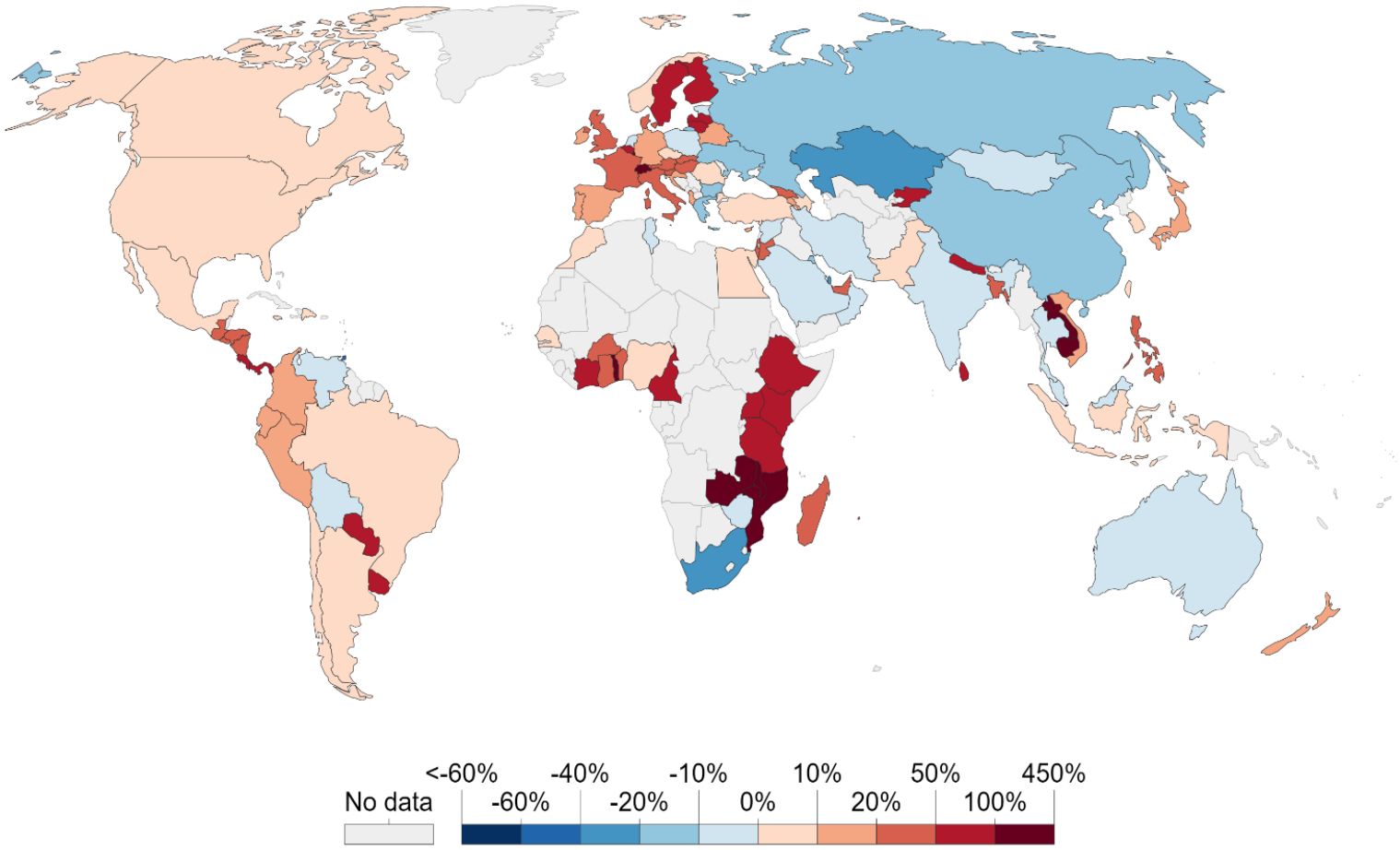

Source: Peters et al. (2012 updated); Global Carbon Project

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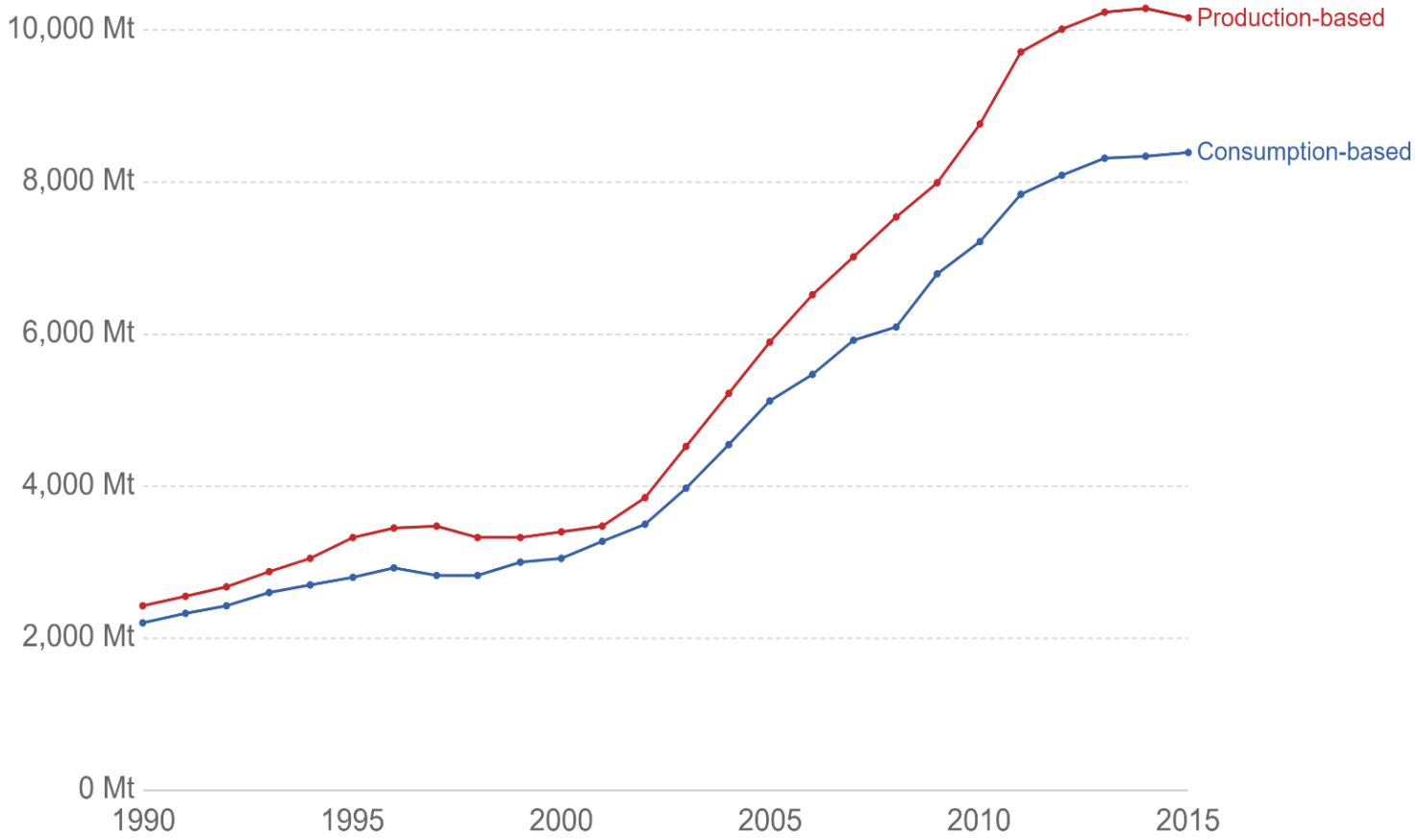
Production vs. consumption-based CO_2 emissions, China

Annual production-based and consumption-based carbon dioxide (CO_2) emissions, measured in million tonnes per year. Consumption-based emissions are those adjusted for trade (production-based emissions minus exports, plus imports). If a country's consumption-based emissions are higher than its production emissions it is a net importer of carbon dioxide.



Source: Le Quéré et al. (2017). Global Carbon Project.

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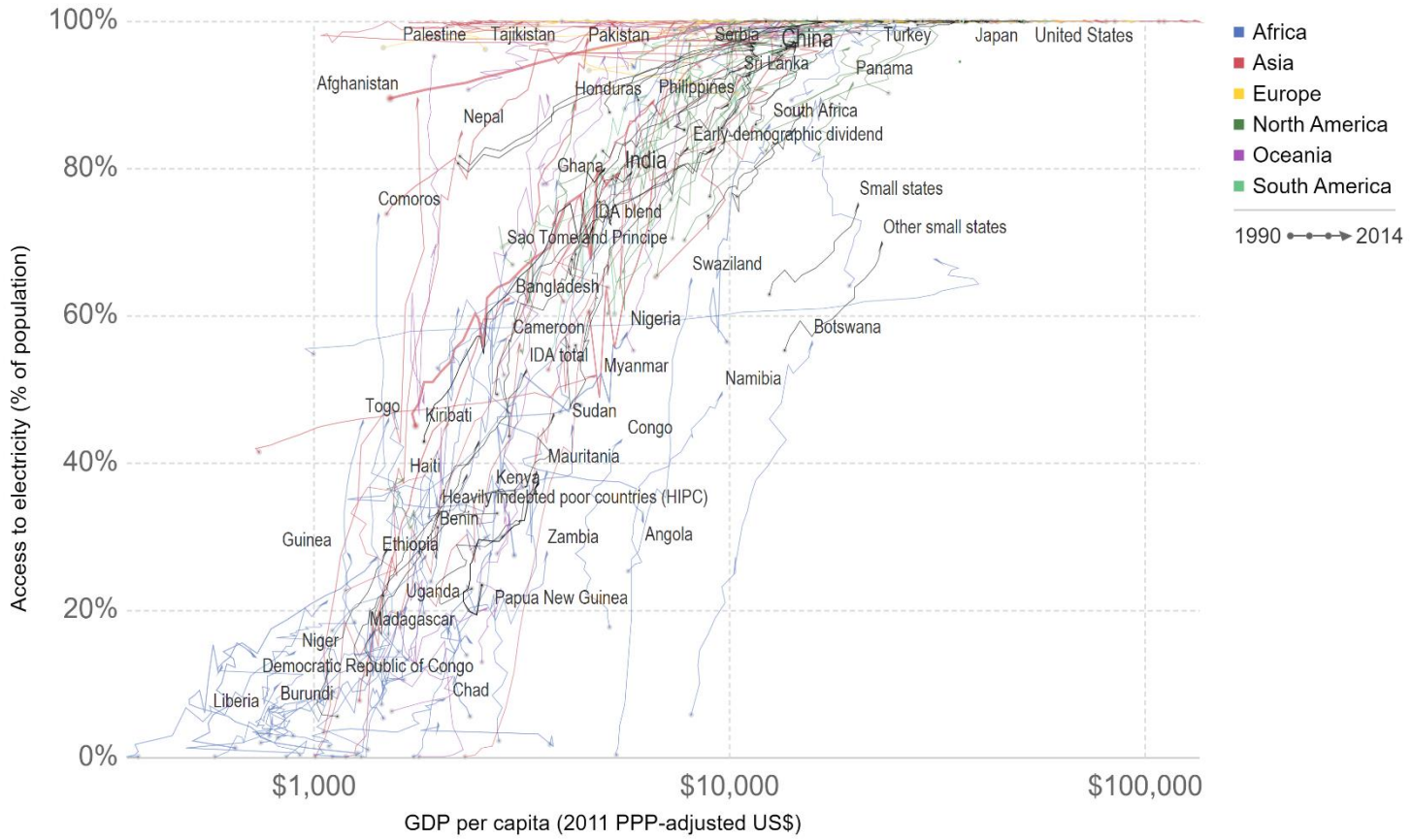
Access to electricity vs. GDP per capita, 1990 to 2014

Access to electricity (measured as the percentage of the population) vs. gross domestic product, GDP (measured in 2011 PPP-adjusted US$)



Source: The World Bank - World Development Indicators (WDI)

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