



IEA Market Report Series - Renewables 2022

Definitions and notes

Renewable Electricity

The electricity generation and capacity forecasts presented in the dynamic chart and the extended dataset correspond to this report's main and accelerated cases. The accelerated case illustrates how certain market and policy enhancements could increase renewable deployment.

Total renewable capacity/generation

Total renewable capacity and generation equals the sum of bioenergy, hydropower (including pumped storage for capacity), onshore and offshore wind, solar PV, solar CSP, geothermal, and ocean technologies.

Hydropower

Electricity generation excludes pumped storage hydropower.

Bioenergy

Capacity includes capacity from solid, liquid, and gaseous biomass and municipal waste (renewable and non-renewable). It does not include plants that co-fire biomass with fossil fuels; though fossil fuel to biomass conversions are included in this forecast, reported capacity data from IEA statistics (2017 and earlier data points) may not include bioenergy capacity converted from fossil fuels, particularly in mixed plants. Generation from bioenergy includes generation from solid, liquid, and gaseous biomass (including co-fired biomass) and the renewable portion of municipal waste.

Wind

Capacity corresponds to grid-connected capacity.

Solar PV

Capacity for grid-connected solar PV (including distributed PV) is counted at the time that the grid connection is made, and off-grid solar PV systems are included at the time of the installation.

Distributed PV

Small capacity Solar PV classified into three main categories: 1) residential (0 to 10 kW); 2) commercial and industrial (10 kW to 1,000 kW); and 3) off-grid applications (such as solar home systems, small commercial applications, and mini-grids). These groupings take not only size into account, but the purpose of the installation and the availability of data.

Ocean

Capacity and generation includes wave, tide, and ocean technologies.

Sources

Renewable electricity generation data up to 2021, and capacity until 2020, for OECD countries is from Renewables Information 2022, at <https://www.iea.org/data-and-statistics/data-product/renewables-information>.

Renewable capacity data is based on a variety sources that are technology dependent.

For hydropower, bioenergy, and geothermal, 2021 capacity is based largely upon S&P Market Intelligence (2022). For CSP, the 2021 capacity data is based largely upon NREL (2022) and BNEF (2022).

For solar PV, onshore wind, offshore wind, and ocean capacity, a variety sources are used ranging from the IEA Technology Collaboration Platforms, BNEF (2022), IRENA (2022) and in-country analysis and project pipelines.

Geographical coverage

The following focus countries and regions are covered in the electricity dataset:

Country	Country Code	Region	Region code
Argentina	ARGENTINA	Africa	AFRICA2
Australia	AUSTRALI	Asia (exc. China) and Pacific	APAC
Belgium	BELGIUM	Association of Southeast Asian Nations	ASEAN
Brazil	BRAZIL	Eurasia	EURASIA2
Canada	CANADA	Europe	EUROPE
Chile	CHILE	European Union	EU
China	CHINA	G20	G20
Denmark	DENMARK	Latin America	LAM
Egypt	EGYPT	Middle East and North Africa	MENA
Ethiopia	ETHIOPIA	North America	NAM
France	FRANCE	Sub-Saharan Africa	SSAFR

Country	Country Code	Region	Region code
Germany	GERMANY	World	WORLD
India	INDIA		
Indonesia	INDONESIA		
Islamic Republic of Iran	IRAN		
Israel	ISRAEL		
Italy	ITALY		
Japan	JAPAN		
Jordan	JORDAN		
Kenya	KENYA		
Korea	KOREA		
Mexico	MEXICO		
Morocco	MOROCCO		
Netherlands	NETHLAND		
Nigeria	NIGERIA		
Pakistan	PAKISTAN		
Philippines	PHILIPPINE		
Poland	POLAND		
Russian Federation	RUSSIA		
Saudi Arabia	SAUDIARABI		
South Africa	SOUTHAFRIC		
Spain	SPAIN		
Sweden	SWEDEN		
Thailand	THAILAND		
Turkiye	TURKEY		

Country	Country Code	Region	Region code
Ukraine	UKRAINE		
United Arab Emirates	UAE		
United Kingdom	UK		
United Republic of Tanzania	TANZANIA		
United States	USA		
Viet Nam	VIETNAM		

The regions are made of the following countries:

- North America: United States, Mexico and Canada.
- Latin America: Argentina, Plurinational State Of Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Curacao/Netherlands Antilles, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Nicaragua Other Non-OECD Americas, Panama, Paraguay, Peru, Trinidad And Tobago, Uruguay and Venezuela.
- Europe: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkiye and United Kingdom.
- Africa: Benin, Botswana, Cameroon, Angola, Congo, Democratic Republic Of The Congo, Eritrea, Ethiopia, Gabon, Ghana, Cote D'ivoire, Kenya, Mauritius, Mozambique, Namibia, United Republic Of Tanzania, Niger, Nigeria, Senegal, South Africa, South Sudan, Sudan, Togo, Zambia, Zimbabwe, Other Africa, Algeria, Egypt, Morocco, Tunisia and Libya.
- Association of Southeast Asian Nations (ASEAN): Brunei Darussalam, Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam.
- Sub-Saharan Africa: Benin, Botswana, Cameroon, Angola, Congo, Democratic Republic Of The Congo, Eritrea, Ethiopia, Gabon, Ghana, Cote D'ivoire, Kenya, Mauritius, Mozambique, Namibia, United Republic Of Tanzania, Niger, Nigeria, Senegal, South Africa, South Sudan, Sudan, Togo, Zambia, Zimbabwe and Other Africa.
- Middle East and North Africa: Islamic Republic Of Iran, Iraq, Jordan, Bahrain, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates, Yemen, Israel, Algeria, Egypt, Morocco, Tunisia and Libya.
- European Union: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania,

Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain and Sweden.

- G20: Australia, Canada, United States, Saudi Arabia, India, Russian Federation, South Africa, Turkiye, Argentina, Brazil, Mexico, France, Germany, Italy, United Kingdom, People's Republic Of China, Indonesia, Japan, Korea and rest of EU countries .
- Asia (exc. China) and Pacific: Japan, Korea, New Zealand, Australia, Bangladesh, Brunei Darussalam, Cambodia, Chinese Taipei, India, Indonesia, Malaysia, Mongolia, Myanmar, Nepal, Democratic People's Republic Of Korea, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Viet Nam and Other Asia.
- Eurasia: Azerbaijan, Belarus, Bosnia And Herzegovina, Armenia, Georgia, Gibraltar, Kazakhstan, Kosovo, Kyrgyzstan, Republic Of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, Albania, North Macedonia, Montenegro and Serbia.
- World: North America, Latin America, Europe, APAC, Eurasia, SSAFR, MENA and China Region.

Renewable Transport

Ethanol

Consumption (TES), production (INDPROD) and net trade (NETTRADE) presented in volume (million litres per year); to convert to energy an approximate calorific value of 21 MJ/litre can be used.

Biodiesel

Consumption (TES), production (INDPROD) and net trade (NETTRADE) presented in volume (million litres per year); to convert to energy an approximate calorific value of 33 MJ/litre can be used.

Renewable Diesel

Consumption (TES), production (INDPROD) and net trade (NETTRADE) presented in volume (million litres per year); to convert to energy an approximate calorific value of 34 MJ/litre can be used.

Biojet

Consumption (TES), production (INDPROD) and net trade (NETTRADE) presented in volume (million litres per year); to convert to energy an approximate calorific value of 34.5 MJ/litre can be used.

Sources

Biofuels: IEA analysis; CNMC, 2022; IEA, 2022; EPA, 2022; MAPA, 2022; Ministère de la Transition Écologique, 2021, Ministério de Mins e Energia, 2022; Statistics Canada, 2022; US EIA, 2022, IHS Markits 2022

Time period

Data available from 2010 to 2027

Geographical coverage

The following focus countries and regions are covered in the transport dataset:

Country	Country Code	Region	Region code
Argentina	ARGENTINA	Africa	AFRICA
Australia	AUSTRALI	Asia and Pacific	APAC
Austria	AUSTRIA	Europe	EUROPE
Belgium	BELGIUM	Latin America	LATIN AMERICA
Brazil	BRAZIL	Middle East	MIDDLEEAST
Canada	CANADA	North America	NORTH AMERICA
China	CHINA	World	WORLD
Colombia	COLOMBIA		
France	FRANCE		
Germany	GERMANY		
Hungary	HUNGARY		
India	INDIA		
Indonesia	INDONESIA		
Italy	ITALY		
Malaysia	MALAYSIA		
Netherlands	NETHLAND		
Paraguay	PARAGUAY		
Philippines	PHILIPPINE		
Poland	POLAND		
Singapore	SINGAPORE		

Spain	SPAIN		
Thailand	THAILAND		
United Kingdom	UK		
United States	USA		

The regions are made of the following countries:

- Africa: Algeria, Angola, Benin, Botswana, Cameroon, Congo, Congorep, Egypt, Eritrea, Ethiopia, Gabon, Ghana, Coteivoire, Kenya, Libya, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Senegal, South Africa, South Sudan, Sudan, Tanzania, Togo, Tunisia, Zambia, Zimbabwe and Other Africa.
- Middle East: Bahrain, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudiarabi, Syria, UAE and Yemen.
- Asia and Pacific: Japan, Korea, New Zealand, Australia, Bangladesh, Brunei Darussalam, Cambodia, Chinese Taipei, India, Indonesia, Malaysia, Mongolia, Myanmar, Nepal, Democratic People's Republic Of Korea, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Viet Nam and Other Asia.
- World: United States, Mexico, Canada, Argentina, Plurinational State Of Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Curacao/Netherlands Antilles, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Nicaragua Other Non-OECD Americas, Panama, Paraguay, Peru, Trinidad And Tobago, Uruguay, Venezuela, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkiye, United Kingdom, Japan, Korea, New Zealand, Australia, Bangladesh, Brunei Darussalam, Cambodia, Chinese Taipei, India, Indonesia, Malaysia, Mongolia, Myanmar, Nepal, Democratic People's Republic Of Korea, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Viet Nam, Other Asia, Azerbaijan, Belarus, Bosnia And Herzegovina, Armenia, Georgia, Gibraltar, Kazakhstan, Kosovo, Kyrgyzstan, Republic Of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, Albania, North Macedonia, Montenegro, Serbia, Benin, Botswana, Cameroon, Angola, Congo, Democratic Republic Of The Congo, Eritrea, Ethiopia, Gabon, Ghana, Cote D'ivoire, Kenya, Mauritius, Mozambique, Namibia, United Republic Of Tanzania, Niger, Nigeria, Senegal, South Africa, South Sudan, Sudan, Togo, Zambia, Zimbabwe, Other Africa, Islamic Republic Of Iran, Iraq, Jordan, Bahrain, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates, Yemen, Israel, Algeria, Egypt, Morocco, Tunisia, Libya, People's Republic Of China and Hong Kong

Renewable Heat

Total heat consumption (incl. traditional uses of biomass)

Refers to the total amount of renewable and non-renewable energy used for heat by industry, buildings and agriculture sectors. It includes estimates of traditional uses of biomass, but excludes ambient heat harnessed by heat pumps, for which data is not available.

Total non-renewable heat consumption

Refers to the total amount of non-renewable energy used for heat by industry, buildings and agriculture sectors.

Total renewable heat consumption (incl. traditional uses of biomass and indirect consumption)

Refers to the total amount of renewable energy used for heat by industry, buildings and agriculture sectors. It includes direct consumption of solar thermal, geothermal and bioenergy for heat, as well as indirect consumption of renewable energy through district heating networks and electricity used for heat and estimates of traditional uses of biomass. Indirect consumption of renewable energy for heat is estimated based on the national shares of renewable sources in electricity generation and in district heating supplies. It does not account for ambient heat harnessed by heat pumps, for which data is not available.

Modern renewable heat consumption (incl. indirect consumption)

Refers to the total amount of renewable energy used for heat, and excludes the traditional uses of biomass. It includes direct consumption of solar thermal, geothermal and bioenergy for heat, as well as indirect consumption of renewable energy through district heating networks and electricity used for heat. Indirect consumption of renewable energy for heat is estimated based on the national shares of renewable sources in electricity generation and in district heating supplies. It does not account for ambient heat harnessed by heat pumps, for which data is not available.

Direct modern renewable heat consumption

Includes direct consumption of bioenergy, solar thermal and geothermal heat. It does not account for ambient heat harnessed by heat pumps, for which data is not available.

Indirect renewable heat consumption (renewable electricity for heat and renewable district heating and cooling)

includes renewable energy consumed through district heating networks and renewable electricity used for heat. These are estimated based on national shares of renewable sources in district heating supplies and electricity generation. It does not account for ambient heat harnessed by heat pumps, for which data is not available.

Sources:

IEA, 2022; World Energy Outlook 2022 & IEA 2022; World Energy Statistics and Balances

Geographical coverage

The following focus countries and regions are covered in the heat dataset:

Country	Country Code	Region	Region code
Canada	CANADA	European Union	EU
Japan	JAPAN	World	WORLD
Russia	RUSSIA		
China	CHINA		
India	INDIA		
Brazil	BRAZIL		
United States	USA		

The regions are made of the following countries:

- European Union: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain and Sweden.
- World: United States, Mexico, Canada, Argentina, Plurinational State Of Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Curacao/Netherlands Antilles, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Nicaragua Other Non-OECD Americas, Panama, Paraguay, Peru, Trinidad And Tobago, Uruguay, Venezuela, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkiye, United Kingdom, Japan, Korea, New Zealand, Australia, Bangladesh, Brunei Darussalam, Cambodia, Chinese Taipei, India, Indonesia, Malaysia, Mongolia, Myanmar, Nepal, Democratic People's Republic Of Korea, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Viet Nam, Other Asia, Azerbaijan, Belarus, Bosnia And Herzegovina, Armenia, Georgia, Gibraltar, Kazakhstan, Kosovo, Kyrgyzstan, Republic Of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, Albania, North Macedonia, Montenegro, Serbia, Benin, Botswana, Cameroon, Angola, Congo, Democratic Republic Of The Congo, Eritrea, Ethiopia, Gabon, Ghana, Cote D'ivoire, Kenya, Mauritius, Mozambique, Namibia, United Republic Of Tanzania, Niger, Nigeria, Senegal, South Africa, South Sudan,



Sudan, Togo, Zambia, Zimbabwe, Other Africa, Islamic Republic Of Iran, Iraq, Jordan, Bahrain, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates, Yemen, Israel, Algeria, Egypt, Morocco, Tunisia, Libya, People's Republic Of China and Hong Kong