Monthly Wind and Solar Capacity Data Methodology

This document covers our methodology for Ember's monthly wind and solar capacity dataset. As of 20/03/2026 this dataset covers 25 countries and/or regions, which represent approximately 92% of global solar capacity and 91% of global wind capacity.

The coverage of this dataset will be extended on a rolling basis. Please feel free to reach out to us, if you know of any available sources/countries that are not yet covered in this dataset.

If you notice any issues or have any suggestions, comments, or questions, please contact the author at leonard@ember-energy.org.

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Definition of *"Installed Capacity"*

The term "installed capacity" refers to the maximum potential output of a given fuel type over a specified period. Common synonyms include rated capacity, nominal capacity, nameplate capacity, and maximum effect. For individual generation units, this typically denotes full-load operation as designed by the manufacturer.

In the context of thermal power generation, installed capacity often exceeds the theoretical maximum of energy produced due to self-consumption. As a result, a distinction is made between "nominal capacity" or "nameplate capacity" and "gross capacity." Gross capacity reflects the maximum output minus self-consumption.

For intermittent renewable sources like wind and solar, installed capacity represents the maximum output under ideal conditions.

Solar AC/DC

Reporting on solar PV capacity varies by source. Some report based on inverter capacity (measured in alternating current, or AC), while others use panel capacity (measured in direct current, or DC). This EIA article explains the differences between AC and DC in more detail.

To maintain transparency and comparability, we provide capacity figures in both AC and DC in the file download. We follow country-specific reporting methods for source values, while the alternate value (not directly reported) is calculated by Ember. Since there is no universal conversion rate between AC and DC, we apply a case-by-case approach, using a default AC/DC conversion factor of 1.3 where needed.

Data from the API endpoint and in the data tool has been harmonised to GWDC. The aggregate category *"Wind and solar"* also uses GWDC as base value. The side-effect is that there is a discrepancy between this dataset and Ember's yearly installed capacity dataset. The reason is that one of our most important sources, the International Renewable Energy Agency (IRENA), reports their values for solar capacity in AC.

Classification of Wind On- and Offshore

The vast majority of global wind capacity - 93% in 2024 according to IRENA - is installed on land. Almost all of offshore wind energy is deployed in China and Europe, which together account for 94% of all offshore wind capacity. As a result, some countries with only a small number of offshore wind farms do not report onshore and offshore wind capacity as separate categories.

We report onshore and offshore wind capacities as separate values whenever our data sources provide this distinction. Where a source does not differentiate between the two, we refer to IRENA data to determine whether the country has any installed offshore wind capacity.

- No offshore capacity: If IRENA indicates no offshore installations, we classify all wind capacity as onshore. This approach has the downside that new additions of offshore wind capacity are not immediately captured. We are exploring alternative data sources to address this limitation.
- With offshore capacity: If offshore installations exist, but the source does not disclose them, we report the combined figure as "*Unknown wind*".

For countries without any offshore capacity, we avoid including the time series *"Offshore wind"* as it would simply sum to zero.

The dataset also includes an aggregated *"Wind"* entry for all countries. To remain consistent with our approach that all aggregate values need at least one level of sub-aggregation, countries that either only have *"Unknown wind"* data—currently Finland and South Korea—or only *"Onshore wind"* will show this value equal to the *"Wind"* aggregate value.

Publication schedule

We update this dataset twice monthly to ensure the most recent data is always available:

- On the 5th of each month or the first working day thereafter.
- On the 27th of each month or the first working day thereafter.

Not all countries release their data on the same day each month. We therefore hold off on the 2nd publication for each month until countries with large solar and wind capacities—notably the USA and China—have published their latest data.

Time series length

- The time series duration varies by source. We include data going back to 2016 or the earliest date available for each source.
- Lag times differ as well. We always publish the latest available data, which means some countries may appear more current than others depending on their reporting schedules.
- Since we rely on multiple sources for some countries it can happen that those sources have different lag times as well, which may lead to different lags for wind and solar capacity. We have noted this in the country specific methodology, if this is the case.

Regional and world aggregates

This dataset provides global wind and solar capacity estimates, including breakdowns for the EU, G7, G20, and OECD. We established the baseline by scaling up available monthly capacity data from reporting countries based on their share of the latest annual regional totals. For countries without monthly data, we estimate solar installations using Ember's China solar export tracker as a proxy. We assume an export-to-capacity deployment rate of 85% and a six-month installation lag. To estimate wind capacity, we extrapolate growth patterns observed in reporting countries. Currently, we do not report a separate estimate for onshore and offshore wind. Offshore wind deployment in particular follows irregular patterns. A single month might see large wind farms come online, followed by months of zero new installations. We may revisit this approach in the future.

Additional comments

- Solar includes both solar thermal and photovoltaic (PV) capacity.
- Solar includes utility scale as well as distributed or rooftop installations.
- Month-on-month changes in capacity are generally expected to be strictly positive for each country, as new installations—particularly for solar—typically outstrip decommissioning of old ones. However, some countries report decreases in installed capacity in certain months. We accept this data as reported unless there is a clear reason to disregard it. As of today (20/03/2026) we have not had a reason to disregard a data point. Should this change in the future we will note it down in the respective country methodology.

- Some countries initially release preliminary figures, which may be revised later. As a result, we routinely re-fetch historical data to incorporate finalized numbers. While this may occasionally lead to—usually upward—revisions of data these are typically minor. A few countries have a tendency to post major revisions of their data going back as far as two years, mostly this is a result of delayed registrations of distributed/rooftop solar capacity. As of today (20/03/2026) we publish the data as-is for every country. However, as we gather more data, and potentially add more countries, we might consider looking into correcting or upscaling more source data. For countries where this problem is more pronounced we have noted it in the country-specific methodology. If anything, this dataset is undercounting the actual scale and pace of global wind and solar deployment.

Country-specific Methodology

Historical sources are reported for all countries in our dataset below. Any further relevant information is included on a per-country basis.

Argentina

Sources

Compañia Administradora Del Mercado Mayorista Eléctrico (CAMMESA)

AC/DC correction

- Source data is published in DC

Onshore and Offshore wind split

- The source does not provide a breakdown between onshore and offshore wind capacity.
- According to data from IRENA, Argentina had no offshore wind capacity as of 2024. Therefore, all wind capacity has been classified as onshore.

Publication lag time

- 1 month
- Published 15th-20th each month

Date start

- 01/2016

Australia

Sources

OpenElectricity, Australian Photovoltaic Institute (APVI)

Country specific comments

- The APVI tracks solar installations based on the government's renewable energy target scheme. Registrations for these installations can be delayed which is why the APVI estimates the values for the most recent months based on historical trends. This, however, means that data can be subject to change for quite some time after their initial publication.
- Since the data from APVI can be lagged by up to five months we are using the growth rates in utility scale solar from OpenElectricity in combination with historical growth rates from APVI's dataset as a proxy for months where APVI has not yet published their data.

AC/DC correction

- Source data is published in DC

Onshore and Offshore wind split

- The source does not provide a breakdown between onshore and offshore wind capacity.
- According to data from IRENA, Australia had no offshore wind capacity as of 2024. Therefore, all wind capacity has been classified as onshore.

Publication lag time

- APVI: Up to 5 months. Data is updated quarterly, usually in the 2nd month of each quarter
- OpenElectricity: 0 months

Date start

- 01/2016

Belgium

Sources

Elia

Country specific comments

- Capacity is an estimation by the TSO for their wind and solar forecast. Data was back-tested against year-end values against other sources, which showed it to be usable.

AC/DC correction

- Source data is published in DC

Onshore and Offshore wind split

- The source does provide a breakdown between onshore and offshore wind capacity.

Publication lag time

- 0 months

Date start

- 01/2016

Brazil

Sources

Agência Nacional de Energia Elétrica (ANEEL)

AC/DC correction

- Source data is published in AC

Onshore and Offshore wind split

- The source does not provide a breakdown between onshore and offshore wind capacity.
- According to data from IRENA, Brazil had no offshore wind capacity as of 2024. Therefore, all wind capacity has been classified as onshore.

Publication lag time

- 0 months

Date start

- 01/2016

Chile

Sources

Coordinador Eléctrico Nacional (cen)

AC/DC correction

- Source data is published in DC

Onshore and Offshore wind split

- The source does not provide a breakdown between onshore and offshore wind capacity.
- According to data from IRENA, Chile had no offshore wind capacity as of 2024. Therefore, all wind capacity has been classified as onshore.

Publication lag time

- 1 month
- Published between the 23rd and 25th each month

Date start

- 02/2019

China

Sources

China Electricity Council (cec), National Energy Administration (nea), Global Energy Monitor (gem)

Country specific comments

- Historical data were sourced from the CEC, whose website has been inaccessible from outside China since at least July 2024. Since then, we have used NEA data instead. As the CEC republishes NEA data, the coverage remains consistent.
- Between 04/2016 and 11/2016, no installed capacity was published for solar. The missing data was linearly interpolated.
- Neither NEA nor CEC provide an onshore/offshore wind capacity breakdown in their monthly releases. However, the NEA's quarterly press conference transcripts typically include updated offshore capacity figures. For historical sub-quarterly offshore installations, we used GEM's Global Wind Power Tracker to model monthly increases, scaling the GEM month-on-month figures to match the NEA's quarterly totals.

- Latest offshore capacity data are taken from NEA press conferences where available. Sub-quarterly data are linearly interpolated. For months where the NEA has only published aggregate wind capacity numbers, we have carried forward the latest available ratio of on- to offshore wind installations.

AC/DC correction

- Source data is published in AC
- We are upscaling the data by 20% to reach DC values.

Onshore and Offshore wind split

- The source does not provide a breakdown between onshore and offshore wind capacity.
- We have estimated the breakdown in on- and offshore wind capacity as described above.

Publication lag time

- 1 month
- Published around the 22nd each month

Date start

- 01/2016

Denmark

Sources

Energi Data Service (EDS)

Country specific comments

- There is a noticeable drop in offshore capacity between 2021-01 and 2021-03. As per the source data it looks like the 605 MW wind farm Kriegers Flak was commissioned by 2020-10. The operator Vattenfall however states that Kriegers Flak was commissioned in the summer of 2021. We assume there to be a mismatch between the commissioning dates of this wind farm. Most likely the connection for the entire wind farm got taken partially offline after initial testing or due to additional construction work etc. We have opted to use EDS as the single source of truth, even if in this case it does not align with the commissioning dates of the operator.

AC/DC correction

- Source data is published in AC

Onshore and Offshore wind split

- The source does provide a breakdown between onshore and offshore wind capacity.

Publication lag time

- 1 month
- Published beginning of the month

Date start

- 01/2016

Finland

Sources

Fingrid

Country specific comments

- Capacity is an estimation by the TSO for their wind and solar forecast. Data was back-tested against year-end values against other sources, which showed it to be usable.

AC/DC correction

- Source data is published in DC

Onshore and Offshore wind split

- The source does not provide a breakdown between onshore and offshore wind capacity. All wind capacity has therefore been classified as Unknown wind.

Publication lag time

- 0 months

Date start

- 01/2016

France

Sources

Open Data Réseaux Énergies (ODRE)

AC/DC correction

- Source data is published in DC

Onshore and Offshore wind split

- The source does provide a breakdown between onshore and offshore wind capacity.

Publication lag time

- Inconsistent
- Historically data seems to be updated roughly quarterly, but in recent months updates happened with a 2-month lag

Date start

- 01/2016

Germany

Sources

Bundesnetzagentur (BNetzA) as reported by Energy-Charts

AC/DC correction

- Source data is published in both AC and DC

Onshore and Offshore wind split

- The source does provide a breakdown between onshore and offshore wind capacity.

Publication lag time

- 1 month
- Published at the beginning of each month

Date start

- 01/2016

Hungary

Sources

Magyar Villamosenergia-ipari Átviteli Rendszerirányító Zártkörűen Működő Részvénytársaság (MAVIR)

Country specific comments

- MAVIR only provides data for the most recent month. We were able to reconstruct some historical data points and have used linear interpolation to fill in the gaps. Historical data is therefore mostly an estimate. Data from July 2025 onwards reflects the data as published by MAVIR.

AC/DC correction

- Source data is published in DC

Onshore and Offshore wind split

- As a landlocked country Hungary does not have any offshore wind capacity. All wind has therefore been classified as onshore.

Publication lag time

- 1 month
- Published middle of each month

Date start

- 01/2016

India

Sources

National Power Portal (CEA)

AC/DC correction

- Source data is published in AC

Onshore and Offshore wind split

- The source does not provide a breakdown between onshore and offshore wind capacity.
- According to data from IRENA, India had no offshore wind capacity as of 2024. Therefore, all wind capacity has been classified as onshore.

Publication lag time

- 2 months

Date start

- 03/2019

Italy

Sources

Terna

AC/DC correction

- Source data is published in DC

Onshore and Offshore wind split

- The source does not provide a breakdown between onshore and offshore wind capacity.
- Italy has only one offshore wind farm with a capacity of 30 MW. We have added this to the time series.

Publication lag time

- 1 month
- Published at the end of each month

Date start

- 01/2021

Japan

Sources

Chubu Electric Power Company (CHUDEN), Chugoku Electric Power Company (ENERGIA), Hokkaido Electric Power Company (HEPCO), Hokuriku Electric Power Company (RIKUDEN), Kansai Electric Power Company (KEPCO), Kyushu Electric Power Company (KYUDEN), Okinawa Electric Power Company (OKIDEN), Shikoku Electric Power Company (YONDEN), Tohoku Electric Power Company (TOHOKUEPCO), Tokyo Electric Power Company (TEPCO), Feed-in-tariff information disclosure website (ENECO-FIT), Japan Wind Power Association (JWPA)

Country specific comments

- All 10 Japanese TSOs publish an *"Application Status for Renewable Energy"* (jpn.: 再生可能エネルギーの申込状況). This provides an overview of grid-connected renewable

energy in each TSO's respective area with monthly granularity. The sum of these figures yields the total installed capacity for all of Japan.
- The publication lag times vary between TSOs. Most notably, data from OKIDEN can be up to 5 months behind those of other TSOs. If TSOs representing at least 75% of overall installed capacity have published their data for a given month, we interpolate the not yet published data.
- The historical values published by the TSOs only go back as far as October 2018 (and in the case of TEPCO, only to April 2019). We have therefore used data from the Feed-in Tariff information system to estimate any data before October 2018.
- The TSOs do not publish historical offshore capacity installations. We have used a publication from the JWPA to construct a historical offshore capacity time series. Newer data is split into onshore and offshore.

AC/DC correction

- Source data is published in AC and upscaled by 30%

Onshore and Offshore wind split

- The source does provide a breakdown between onshore and offshore wind capacity.

Publication lag time

- Between 1 and 5 months per TSO

Date start

- 01/2016

Netherlands

Sources

National Energy Dashboard (NED)

Country specific comments

- The NED contains a measure called *"capacity"*, which is the total available capacity over a given time period as well as a measure called "*percentage*", which represents the %-availability of the fuel source over the same time period.
- The value for installed capacity can therefore be reverse engineered by dividing the values for *"capacity"* by "*percentage*".
- The output of this calculation is called *"effective capacity"* by the NED, which they have explained to be around 16.5% below the nameplate capacity for solar and around 10% below for wind. The data is upscaled accordingly.

- The scaling leads to a total installed capacity for both wind and solar that is above official publications, such as the Centraal Bureau voor de Statistiek (CBS). At the moment we have decided to accept the data as is, but are looking into options to correct the data.

AC/DC correction

- Source data is published in DC

Onshore and Offshore wind split

- The source does not provide a breakdown between onshore and offshore wind capacity.

Publication lag time

- 0 months

Date start

- 01/2016

Poland

Sources

Agencja Rynku Energii (ARE) as reported by Instrat

AC/DC correction

- Source data is published in AC

Onshore and Offshore wind split

- The source does not provide a breakdown between onshore and offshore wind capacity.
- According to data from IRENA, Poland had no offshore wind capacity as of 2024. Therefore, all wind capacity has been classified as onshore.

Publication lag time

- 2 months

Date start

- 01/2016

Portugal

Sources

Redes Energéticas Nacionais (REN), Direção-Geral de Energia e Geologia (DGEG)

Country specific comments

- REN publishes its data with 1 month less lag compared to DGEG, but does not cover distributed solar and small-scale wind. In case of missing data from DGEG we use data from REN and upscale them according to the latest ratio for both wind and solar.
- The earliest data from DGEG are from 07/2022. Therefore REN data is used and upscaled by 41% for solar and 5% for wind, which is the average difference for 07/2022-12/2022.

AC/DC correction

- Source data is published in AC

Onshore and Offshore wind split

- The source does not provide a breakdown between onshore and offshore wind capacity.
- Portugal has only one offshore wind farm with a capacity of 25 MW. This has been added manually to the time series. Should Portugal install more offshore capacity, but not provide a breakdown in their source we may have to reclassify wind capacity as unknown.

Publication lag time

- REN: 1 month
- DGEG: 2 months

Date start

- 01/2016

South Africa

Sources

Eskom

Country specific comments

- The values for distributed solar are an estimation by the grid operator Eskom. However, they are consistent with other sources.
- Installed capacity for distributed solar has only been published since 07/2022. We have used yearly data from IRENA to calculate a delta between utility and distributed solar and have used this to estimate missing data points for distributed solar.

AC/DC correction

- Source data is published in AC

Onshore and Offshore wind split

- The source does not provide a breakdown between onshore and offshore wind capacity.
- According to data from IRENA, South Africa had no offshore wind capacity as of 2024. Therefore, all wind capacity has been classified as onshore.

Publication lag time

- 1 month

Date start

- 12/2020

South Korea

Sources

Electric Power Statistics Information System (EPSIS)

AC/DC correction

- Source data is published in AC

Onshore and Offshore wind split

- The source does not provide a breakdown between onshore and offshore wind capacity. All wind capacity has therefore been classified as unknown.

Publication lag time

- 0 Months

Date start

- 01/2016

Spain

Sources

Red Eléctrica de España (REE)

Country specific comments

- Spain publishes data up until the current month. However, large retroactive updates in their data have been observed. As a compromise we are cutting off data at the 3-month mark.
- We periodically re-fetch historical data for Spain in order to account for any retroactive capacity updates.

AC/DC correction

- Source data is published in AC

Onshore and Offshore wind split

- The source does not provide a breakdown between onshore and offshore wind capacity.
- According to data from IRENA, Spain has only marginal offshore wind capacity (5 MW) as of 2024. Due to rounding this appears as Spain having 0 GW of installed offshore capacity in the final dataset.

Publication lag time

- 0 Months

Date start

- 01/2016

Taiwan (China)

Sources

Bureau of Energy (ESIST) via E-Stat Dashboard

AC/DC correction

- Source data is published in DC

Onshore and Offshore wind split

- The source does provide a breakdown between onshore and offshore wind capacity.

Publication lag time

- 2 months
- Published at the beginning of each month

Date start

- 01/2016

The Philippines

Sources

Department of Energy (doe)

AC/DC correction

- Source data is published in DC

Onshore and Offshore wind split

- The source does provide a breakdown between onshore and offshore wind capacity.

Publication lag time

- Inconsistent
- Some files had a lag of 5 months, some of 2 months. Sometimes multiple files were published in the same month.

Date start

- 01/2016

Türkiye

Sources

Yük Tevzi Bilgi Sistemi (YTBS)

Country specific comments

- The load dispatch information system (Tur: Yük Tevzi Bilgi Sistemi) is maintained by the TSO Teias, which in turn gets most of their data, especially for small scale and distributed solar systems, from regional DNOs. As best we can tell there seems to be

no regular update process for this data. It appears that updates occur ad hoc as new data is being made available during irregular intervals. We have noticed significant upward adjustments in installed solar capacity going back as far as 2 years.
- We routinely update historical data, but this does mean that more recent data should be treated with a high degree of caution.

AC/DC correction

- Source data is published in DC

Onshore and Offshore wind split

- The source does not provide a breakdown between onshore and offshore wind capacity.
- According to data from IRENA, Türkiye had no offshore wind capacity as of 2024. Therefore, all wind capacity has been classified as onshore.

Publication lag time

- 0 month

Date start

- 01/2016

United Kingdom

Sources

Renewable Energy Planning Database (REPD), Department for Energy Security and Net Zero - Energy Trends: UK renewables (DESNZ_WIND), Department for Energy Security and Net Zero - Solar photovoltaics deployment (DESNZ_SOLAR),

Country specific comments

- DESNZ publishes a monthly time series for installed capacity for solar PV.
- The time series for wind is only published quarterly.
- We use data from the REPD to estimate the sub-quarterly growth rate of wind on- and offshore capacity. We use the data on new installations and fit the month-on-month growth rate in percent from the REPD to the total quarterly growth.
- Given the different publication schedule the data for solar capacity is usually a few months ahead of the data for wind capacity.
- While the REPD is also only updated quarterly, usually it is 1-2 months ahead of publications for wind from DESNZ. In such cases we are using new installations from the REPD as a proxy for wind capacity additions.

AC/DC correction

- Source data is published in DC

Onshore and Offshore wind split

- The source does provide a breakdown between onshore and offshore wind capacity.

Publication lag time

- Solar
  - 1 month
  - Published between the 23rd or 31st each month
- Wind
  - 3 months
  - Data is published quarterly on the last Thursday of the following quarter
- Renewable Energy Planning Database
  - 1-2 months
  - The REPD is updated quarterly with either 1 or 2 months delay

Date start

- 01/2016

United States

Sources

Energy Information Agency (EIA)

Country specific comments

- Data is taken from table *"6.01 - Electric Generating Summer Capacity Changes"*.
- The API from the EIA does not include distributed solar and has had a longer lag than the Excel file publication, which is why we opted to use the publication in Excel format over the API endpoint.
- The EIA estimates the capacity for distributed solar via survey. That means the values for solar can be subject to correction for up to a year. We routinely refetch historical data to get the latest available data.

AC/DC correction

- Source data is published in AC

Onshore and Offshore wind split

- The source does provide a breakdown between onshore and offshore wind capacity.

Publication lag time

- 2 months
- Published on the 23rd or 24th each month

Date start

- 01/2016