

Enwex rulebook - version 2026

30.12.2025
with additional regions from 15.06.2026
with updated versioning routine after market consultation, 09.10.2026

for Global indices (except Europe)

Enwex Energy Weather Indices are created to meet the optimized balance between (i) accuracy of represented weather development data and (ii) simplicity for a sufficient understanding by traders and markets.

Enwex is a registered trademark (EUIPO reg. No. 018892447). ENWEX has established its index methodology and governance framework with reference to the IOSCO Principles for Financial Benchmarks, applying a proportionate approach reflecting the nature and use of its indices. ENWEX monitors the applicability of the EU Benchmark Regulation (BMR) to its activities.

The indices are published in immutable versions pursuant to the following methodology:

1.) Index basics

- Generally, any Enwex Index is representing a certain predefined territory (market region or countrywide).
- A predefined territory, if possible, the largest political unit, e.g. provinces or federal states, with their fraction of supply (wind, solar) or demand (via population for temperature products) determine the weighting of the representative grid point.
- These grid points per territory are determined as the nearest one to the middle of a province. For each parameter the same grid point per province is used.
- The spatial resolution of the grid is 0,25° Lat Lon, the temporal resolution is hourly with timestamps representing the hour begin.
- This temporal resolution will persist in case of markets allowing a higher temporal resolution of prices, as weather models and their data resolution are decisive for Enwex. So for derivatives on Enwex, e.g. market values / PPA / capture rates, the power prices will be averaged for the forecasted hour and then multiplied by the utilization figure of Enwex.

- Weather parameters currently translated into Enwex Indices:
 - a) Temperature: by population weight per province.
 - b) Wind: by installed capacity per province along transparent datasets as listed in **Appendix 1**.
 - c) Solar: by installed capacity per province along sources in **Appendix1**.
- Day ahead settlement data of Enwex Indices are generally published at 10:00 AM local time (Berlin, GMT+1) at www.enwex.com. This means in local time:
 - U.S. – ERCOT, MISO, SPP: 03:00 (GMT-6)
 - U.S. – PJM: 04:00 (GMT-5)
 - Gas – East U.S.: 04:00 (GMT-5)
 - Japan: 18:00 (GMT+9)
 - Gas – East Asia: 17:00 (GMT+8)
 - AUS – S Australia: 21:30 (GMT+10:30)
 - AUS – Victoria: 22:00 (GMT+11)

2.) Index update routine (every two years)

- ENWEX updates its wind and solar index methodologies every two years to reflect changes in installed generation capacities, their geographical distribution and relevant technological developments. New index versions are identified by their effective year (e.g. v26, v28, v30).
- Total and regional installed capacities are based on end of previous calendar year. If there is no update on regional installed capacities as of 31st of December of previous year, the weighting for the affected country will be done along the latest available publication.
- Each new version is published on 1 July of the preceding calendar year and becomes effective on 1 January of its version year at 00:00 local time in the respective index territory. For example, v28 will be published on 1 July 2027 and become effective on 1 January 2028.
- The six-month period between publication and the effective date allows market participants to compare the existing and upcoming index versions, including their historical and forward curves.
- Methodology updates may include:
 - a) Changes to regional capacity weightings.
 - b) Changes to technological parameters used in the wind and solar utilisation formulas.
 - c) Changes to the relative onshore and offshore capacity weights of combined wind indices.

- Each version retains its methodology, parameters and weightings throughout its publication period. ENWEX will announce the affected indices, relevant parameter and weighting changes, publication date and effective date when releasing a new version.
- The biennial update routine applies to wind and solar indices. Temperature index weightings continue to be reviewed every five years, with the next scheduled update in 2030. For consistency of curve naming, temperature series may nevertheless carry the latest general ENWEX version identifier (e.g. currently v26).
- Fixed-version curves: Each index version has its own curve IDs. The methodology, parameters and capacity weightings of a fixed-version curve remain unchanged throughout its publication period.
For backtesting purposes, each version has an updated backward calculation available for (a) from 1980 to present for reanalysis data and (b) from 2013 to present for EC oper day ahead data. There also is a set of combined curves (c) with begin from 1980 to 2012 including reanalysis data and from 1.1.2013 switching to EC oper day ahead data.
⇒ Within backtest files, the underlying weighting per timeseries stays unchanged through the years of the entire dataset, new versions receive new curve ID's.
- Rolling settlement curves: Each index and territory combination has a permanent rolling settlement curve ID. On 1 January of each new version year, at 00:00 local time, the rolling settlement curve switches to the newly effective index version. All observations belonging to 31 December local time are calculated using the previous version. All observations belonging to 1 January local time are calculated using the new version.
No scheduled methodology version changes take effect during a calendar month.
⇒ For settlement data, curve ID's stay unchanged through the years, but underlying weighting is updating.
- Previous index versions will continue to be published for as long as they are referenced by outstanding contracts, subject to a maximum continuation period of ten years following the end of their effective version year, in accordance with the ENWEX cessation policy.
- Province means and their actual weightings are calculated as regional MW installed divided by total MW installed in the territory. Current values for weighting within a territory are listed in **Appendix 3**.

3.) Weather model specifications

- The weather model applied is the operational model of European center for medium range forecast (ECMWF; <https://www.ecmwf.int/en/about/what-we-do>; <https://www.ecmwf.int/en/publications/ifs-documentation>) in its 0.25 degree spatial resolution and the 00 UTC update.
- Model parameters used from ECMWF oper are:
 - a) Temperature: 2m temperature
 - b) Wind: windspeed in m/s out of 100m level of u-wind and v-wind
 - c) Solar: Incoming shortwave radiation at surface
- Timesteps: Hourly resolution for the forecast period day ahead in local time (e.g. for ERCOT in wintertime H+30 to H+54).
- Fallback routine:
In case of ECMWF model delay, fallback solution for index calculation is with identical method and parameters but using ECMWF operational with basis 12 hours before (12 UTC). This means for e.g. ERCOT (wintertime) then timesteps H+42 to H+66.
- Reanalysis data in API timeseries from 1979 onwards are calculated out of ERA5 models, <https://cds.climate.copernicus.eu/datasets/reanalysis-era5-single-levels?tab=overview> , using the same weather parameters, spatial and temporal resolution as from EC oper.
- Historical data by EC oper and ERA5 for Enwex in the current and previous year's versions can be downloaded via Enwex API. For access and further information mailto info@enwex.com
- Handling of weather model generation switch:
 - a) EC oper: Direct implementation of new model versions after official release by ECMWF with unchanged spatial (0.25°) and temporal (hourly) resolution. Historical Data in API stays unchanged and is always reflecting the latest state of EC oper model at day ahead settlement.
 - b) ERA5: With planned new model generation (ERA6), all historical timeseries will be published with the next version in ERA6 and ERA5 for comparability reasons. After at least twelve months of ERA6 availability, the indices will just be available in the new ERA version.

4.) Index calculation per parameter

Weather parameters used and the formula per territory for calculation of wind and solar utilization are part of the biennial update routine. To handle potential biases driven e.g. by technological improvements on the efficiency factor or the other way round, by aging effects, there is a technology coefficient.

For biases exceeding 0,5% in backtesting of the previous period from January_(year-1) until December_(year) in observation data (e.g. for U.S. it is the EIA), coefficient c will be modified by full % figure, e.g. +1,6% bias will lead to a technology coefficient of 1,02. Any changes to these parameters become effective exclusively on 1 January of the relevant new version year.

The next review of the complete formula for each parameter and its coefficients is scheduled for the Enwex version v30, valid in 2030.

a) Temperature:

Enwex temperature = 2m temperature in ° Celsius

b) Solar:

Enwex solar = Utilization of installed solar capacity $= c * ((f * S * A) / (S_0 * A)) = c * (f * S / S_0)$
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with:

c = technology coefficient = 1,00 (for neutralizing possible general biases)

f = factor depending on mean module efficiency and module orientation, varying per country (e.g., Germany 0,71)

S [W/m²] = shortwave radiation at surface = ECMWF operational model output for incoming radiation at surface

A [m²] = Area of installed solar modules

S_0 [W/m²] = Order of magnitude of the maximum possible solar radiation at the surface = 10³ W/m² = 1000 W/m²

In the USA there is an additional (inverting) term needed to meet the broader maximum observed for noon hours, which is used for radiations values >100 W/m² (below it stays as shown above for other territories):

$S_{\max}$ [W/m²] = maximum daily shortwave radiation at surface

y = weight of inverted term, remainder to 1 is as for other territories

Enwex solar utilization USA for $S > 100$ W/m ² = $c * (f * ((1-y) * S + y * (S_{\max} - S)) / S_0)$
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c) Wind:

$$\begin{aligned} \text{Enwex wind} &= \text{Utilization of installed capacity} \\ &= c * ((U_0 + u_a) / (1,0 + \exp(v_s - s * (w - x_s) - r)) - u_a) \end{aligned}$$

with:

c = technology coefficient = 1,00 (for neutralizing possible general biases)

U₀ = Maximum utilization: Max average power output per installed capacity, usually below 1,00 due to e.g., outages, revisions

u_a = Util addition: modifies slope, subtracted at end of formula to avoid influence on maximum

v_s [m/s] = Start wind speed: average turbine start speed

s = Slope: Steepness of exponential function

w [m/s] = Windspeed: Calculated from the ECMWF operational model output for u- and v-wind components in 100m height

x_s = X-axis shift: Shift to avoid negative values with low wind

r = average roughness length of landscape

Notes:

windspeed values smaller than start wind speed of turbines in this formula providing negative results, therefore need to be replaced by 0. Calculated values exceeding 100% utilisation are capped at 100%, including after application of the technology coefficient.

The settlement value of each ENWEX Index shall be published rounded to two decimal places using commercial rounding (round half away from zero).

Coefficients for renewables per country can be found in **Appendix 2**.

A general note on curtailments:

Enwex does not adjust for curtailments, since the indices are designed to represent weather-driven potential supply rather than actual realized feed-in.

This methodological choice may result in a temporary positive utilization bias compared with reported figures for solar and wind production, such as those published by EIA.

5.) Regulatory Governance Framework

Governance, Oversight and Methodology Control

ENWEX applies a proportionate governance structure, taking into account the nature, scale and use of its indices and drawing on relevant principles of benchmark governance.

- Benchmark Administrator: responsible for methodology approval and annual updates.
- Data Steward: validates input data and monitors data quality.
- IT Lead: oversees operational stability and fallback processes.
- Compliance Function: monitors relevant benchmark governance principles assesses applicable regulatory requirements, including the EU Benchmark Regulation (BMR).
- Oversight is implemented via structured annual self-assessments, with optional external review.

No discretionary judgement is applied outside predefined rules.

Complaints and Consultation Procedures

Users may submit methodology or benchmark-related complaints to info@enwex.com. All complaints are logged, evaluated and resolved according to the Enwex Complaints Procedure.

Material methodology changes follow a consultation process unless operational urgency requires immediate action. Criteria for materiality include parameter changes with >5% expected impact, sourcing changes, or fleet-model revisions.

Cessation and Transition Policy Overview

Enwex maintains yearly benchmark versions for up to ten years or until no open contracts reference them.

Users will be notified at least six months prior to cessation. Transition guidance and alternative benchmark series are provided in the Benchmark Statement.

Appendix 1: Data sources on installed capacities & population

Australia – S Australia:

<https://www.abs.gov.au/census/find-census-data/search-by-area> (as of 10.7.2025)

<http://www.thewindpower.net> (as of 18.7.2025)

<https://pv-map.apvi.org.au/historical#7/-32.445/136.626> (as of 22.9.2025)

Australia – Victoria:

<https://www.abs.gov.au/census/find-census-data/search-by-area> (as of 10.7.2025)

<http://www.thewindpower.net> (as of 18.7.2025)

<https://pv-map.apvi.org.au/historical#7/-32.445/136.626> (as of 22.9.2025)

USA - ERCOT:

<https://digital-vector-maps.com/state-maps-detail/4418/Texas-County-Populations-Map-Adobe-Illustrator.htm> (as of 24.7.2025)

<https://www.txrenewables.net/map> (as of 24.7.2025)

USA – MISO:

<https://cdn.misoenergy.org/PY%202026-2027%20LOLE%20Study%20Report728909.pdf>
(page 15, as of 12.3.2026)

USA - PJM:

https://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2024/2024q2-som-pjm-sec12.pdf (downloaded 30.6.2025)

USA – SPP:

https://www.spp.org/documents/73953/2024_annual_state_of_the_market_report.pdf

[https://www.spp.org/documents/31587/spp%20101%204.1.2026%20-%20\(web\).pdf](https://www.spp.org/documents/31587/spp%20101%204.1.2026%20-%20(web).pdf) (as of 12.3.2026)

Appendix 2: v26 coefficients for renewable utilization

Solar

Australia – S Australia:

$$\text{Solar(SA)} = 1,00 * (0,67 * \text{radiation} / 1000)$$

Australia - Victoria:

$$\text{Solar(VIC)} = 1,00 * (0,70 * \text{radiation} / 1000)$$

USA - ERCOT:

If radiation <100, then Solar(ERC) = 1,00 * (1,15 * radiation / 1000), else

$$\text{Solar(ERC)} = 1,00 * (1,15 * (0,8 * \text{radiation} + 0,2 * (\text{radmax} - \text{radiation})) / 1000)$$

USA – MISO:

If radiation <100, then Solar(MIS) = 1,00 * (1,04 * radiation / 1000), else

$$\text{Solar(MIS)} = 1,00 * (1,04 * (0,8 * \text{radiation} + 0,2 * (\text{radmax} - \text{radiation})) / 1000)$$

USA - PJM:

If radiation <100, then Solar(PJM) = 1,00 * (1,15 * radiation / 1000), else

$$\text{Solar(PJM)} = 1,00 * (1,15 * (0,8 * \text{radiation} + 0,2 * (\text{radmax} - \text{radiation})) / 1000)$$

USA – SPP:

If radiation <100, then Solar(SPP) = 1,00 * (1,05 * radiation / 1000), else

$$\text{Solar(SPP)} = 1,00 * (1,05 * (0,8 * \text{radiation} + 0,2 * (\text{radmax} - \text{radiation})) / 1000)$$

Wind onshore

Australia – S Australia:

$$\text{Wind(SA)} = 0,95 * ((0,91 + 0,02) / (1,0 + \exp(3,0 - 0,59 * (\text{wind} - 2,2) - 0,0074))) - 0,02$$

Australia – Victoria:

$$\text{Wind(VIC)} = 1,00 * ((0,90 + 0,02) / (1,0 + \exp(3,0 - 0,565 * (\text{wind} - 2,5) - 0,0074))) - 0,02$$

USA - ERCOT:

$$\text{Wind(ERC)} = 1,00 * ((0,65 + 0,00) / (1,0 + \exp(3,0 - 0,64 * (\text{wind} - 2,2) - 0,0074))) - 0,00$$

USA – MISO:

$$\text{Wind(MIS)} = 1,00 * ((0,88 + 0,00) / (1,0 + \exp(2,9 - 0,63 * (\text{wind} - 2,2) - 0,0074))) - 0,00$$

USA - PJM:

$$\text{Wind(PJM)} = 1,00 * ((1,0 + 0,00) / (1,0 + \exp(3,0 - 0,63 * (\text{wind} - 2,2) - 0,0074))) - 0,00$$

USA – SPP:

$$\text{Wind(SPP)} = 1,00 * ((0,6 + 0,00) / (1,0 + \exp(3,0 - 0,62 * (\text{wind} - 2,1) - 0,0074))) - 0,00$$

Appendix 3: Countrywide means (v26) and their weightings in %

Australia – South Australia

Province	latitude	longitude	temperature	solar	Latitude	Longitude	wind
Giles	-29,00	134,75	2,6	5,2	-32,50	137,50	18,0
Stuart	-30,50	138,50	2,6	9,2	-33,00	138,50	23,2
Flinders	-32,50	134,50	2,6	1,5	-33,50	136,50	3,0
Mackillop, Mount Gambier	-37,00	140,75	5,2	2,8	-33,75	138,00	18,2
Hammond, Chaffey, Schubert	-35,00	140,00	8,2	17,7	-33,75	139,00	15,7
Narungga, Frome	-33,50	138,25	5,2	5,0	-34,75	135,50	2,8
Mawson, Finniss, Heysen	-35,50	138,50	8,0	5,6	-35,00	137,50	5,2
Adelaide (=Rest)	-35,00	138,75	65,6	53,0	-37,75	140,50	13,9

Australia - Victoria

Province	Latitude	Longitude	temperature	solar	Latitude	Longitude	wind
Mildura (N Victoria)	-35,00	142,25	1,2	11,2	-36,25	142,00	12,0
SW coast, Lowan (W Victoria)	-36,75	142,25	2,8	1,6	-37,00	143,00	14,7
Ripon (W Vic), Polwarth	-38,25	143,50	2,6	2,6	-37,00	145,00	1,4
Gippsland East (E Vic)	-37,75	148,50	1,4	1,1	-37,50	143,50	14,9
Ovens Valley, Benambra	-36,50	146,75	2,6	3,0	-37,75	143,00	13,8
Shepparton, Murray plains (N Vic)	-35,75	144,00	2,8	8,8	-37,75	144,00	13,6
Bendigo E/W, Macedon, Euroa	-37,00	144,75	5,6	11,9	-38,00	142,00	11,5
Eildon, Narracan, Morwell, Gippsland S	-38,25	146,00	5,4	4,4	-38,25	143,00	10,7
Melbourne (=Rest)	-37,50	145,00	75,6	55,4	-38,25	141,50	4,0
					-38,75	146,00	3,4

USA - ERCOT

ERCOT weather zone	Latitude	Longitude	temperature	wind	solar
Coast (Houston)	29,75	-95,50	26,7	0,8	20,0
East (Tyler)	32,25	-95,25	5,0	0,0	9,6
North (Wichita Falls)	33,75	-98,50	2,3	17,2	8,2
North Central (Waco)	31,50	-97,25	33,5	16,6	17,8
South (Corpus Christi)	27,75	-97,50	10,1	22,2	5,6
South Central (San Antonio)	29,50	-98,50	18,0	0,0	6,6
West (Abilene)	32,50	-99,75	2,6	28,1	8,8
Far West (Midland)	32,00	-102,00	1,8	15,1	23,4

USA – MISO

State	Latitude	Longitude	temperature	wind	solar
Arizona	35,00	-112,00	6,6	0,0	0,0
Arkansas	35,00	-92,00	4,2	0,0	2,6
Colorado	39,00	-105,50	8,0	2,6	20,6
Iowa	42,00	-94,00	4,4	1,5	5,9
Kansas	38,50	-98,00	13,6	21,6	1,9
Louisiana	31,00	-92,00	2,2	0,0	1,5
Missouri	38,25	-92,50	14,2	1,2	0,7
Montana	47,00	-110,00	1,0	0,0	1,6
Nebraska	38,50	-98,00	9,1	8,4	4,0
New Mexico	34,00	-106,00	2,0	2,1	20,2
North Dakota	47,50	-100,50	3,2	9,7	0,0
Oklahoma	35,50	-97,50	18,3	30,1	5,0
South Dakota	44,50	-100,00	3,7	7,4	5,4
N Texas	35,25	-101,50	6,7	15,4	30,3
Utah	39,00	-111,00	1,5	0,0	0,0
Wyoming	43,00	-107,00	1,3	0,0	0,3

USA – PJM

Province	Latitude	Longitude	temperature	wind	solar
Delaware	39,00	-75,50	1,5	0,0	0,5
Illinois	40,25	-89,00	13,8	45,4	0,6
Indiana	40,00	-86,25	1,8	19,7	5,7
Kentucky	37,75	-84,25	2,5	0,0	1,0
Maryland	39,00	-76,75	9,5	2,5	4,8
Michigan	44,25	-84,75	0,8	0,0	0,0
N Carolina	35,50	-80,00	1,5	1,7	11,5
New Jersey	40,00	-74,50	14,3	0,1	7,0
Ohio	40,25	-82,75	18,2	9,6	25,6
Pennsylvania	41,00	-77,75	20,0	14,3	7,1
Virginia	37,50	-78,75	13,3	0,1	35,2
West Virginia	38,75	-80,75	2,8	6,6	1,0

USA – SPP

Balancing region / State	Latitude	Longitude	temperature	wind	solar
LRZ 1 - N Dakota, Minnesota	46,25	-94,50	6,3	24,7	4,1
LRZ 2 - E Wisconsin, N Michigan	44,75	-89,75	13,4	3,1	11,4
LRZ 3 - Iowa	42,00	-93,00	7,8	44,5	3,6
LRZ 4 - Illinois	40,25	-89,00	9,1	7,9	17,8
LRZ 5 - Missouri	38,25	-92,50	4,4	1,4	5,7
LRZ 6 - Indiana	40,00	-86,25	12,9	5,0	21,7
LRZ 7 - S Michigan	44,25	-84,75	19,3	12,2	9,9
LRZ 8 - Arkansas	35,00	-92,50	5,7	0,6	13,3
LRZ 9 - Louisiana, E Texas	31,00	-92,00	16,9	0,0	9,0
LRZ 10 - Mississippi	32,75	-89,75	4,2	0,6	3,5

Gas demand region East Asia (JKM)

Share within E Asia region: Japan 70,9%, Korea 29,1%

Japan

Province	latitude	longitude	weights
Chubu (Toyama)	36,50	137,25	18,0
Chugoku (Hiroshima)	34,50	132,50	5,7
Hokkaido (Sapporo)	43,00	141,50	4,1
Kansai (Osaka)	34,75	135,50	17,8
Kanto (Tokyo)	35,45	139,45	34,0
Kyushu & Okinawa (Fukuoka)	33,50	130,50	11,0
Shikoku (Kochi)	33,50	133,50	2,8
Tohoku (Sendai)	38,25	140,75	6,6

Korea

Province	latitude	longitude	weights
1,4,8 (Seoul)	37,50	127,00	50,0
9 (Gangneung)	37,75	128,75	2,9
6,10,11,17 (Daejeon)	36,25	127,25	10,8
3,14 (Daegu)	36,00	128,50	9,6
5,12,13,16 (Gwangju)	35,25	126,75	11,3
2,7,15 (Busan)	35,25	129,00	15,4

Gas demand Region Europe (TTF & NBP)

Country	weights
Belgium	5,44
France	15,76
Germany	39,07
Netherlands	8,32
United Kingdom	31,41

for weightings within the countries compare “Enwex rulebook Europe”

Gas demand region East USA (Henry Hub)

State	Latitude	Longitude	weights
Alabama	32,75	-86,75	3,0
Connecticut	41,75	-72,75	2,1
Delaware	39,00	-75,50	0,6
Georgia	32,75	-83,50	6,4
Illinois	40,25	-89,00	7,6
Indiana	40,00	-86,25	4,0
Kentucky	37,75	-84,25	2,7
Maine	45,25	-69,25	0,8
Maryland	39,00	-76,75	3,7
Massachusetts	42,25	-72,00	4,2
Michigan	44,25	-84,75	6,0
Mississippi	32,75	-89,75	1,8
N Carolina	35,50	-80,00	6,2
New Hampshire	44,00	-71,50	0,8
New Jersey	40,00	-74,50	5,5
New York	43,00	-76,00	12,0
Ohio	40,25	-82,75	7,0
Pennsylvania	41,00	-77,75	7,7
Rhode Island	41,75	-71,50	0,7
S Carolina	34,00	-81,00	3,0
Tennessee	35,75	-86,25	4,1
Vermont	44,00	-72,50	0,4
Virginia	37,50	-78,75	5,1
West Virginia	38,75	-80,75	1,1
Wisconsin	44,75	-89,75	3,5