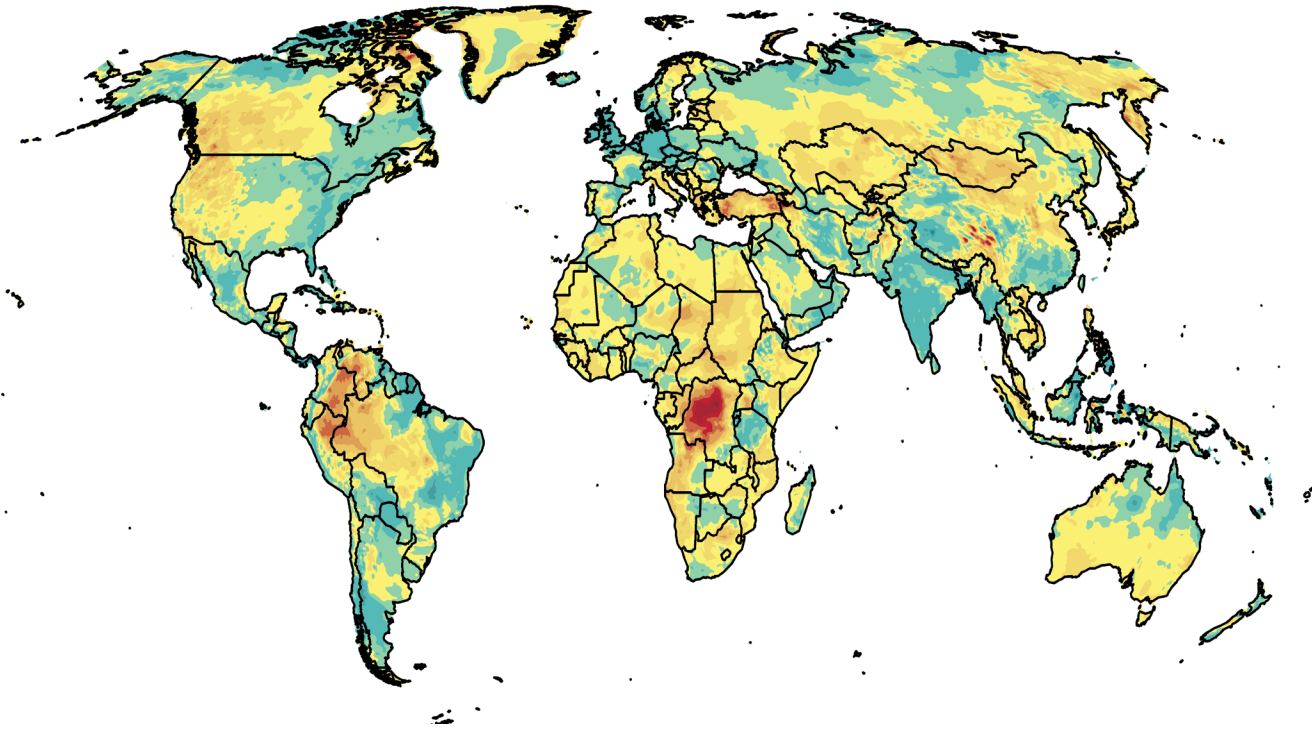




2021 | Annual Global

Wind Trends

Global wind speed performance



The Wind Trends Bulletin depicts anomalies of the global wind resource from the historical norm on a monthly, quarterly, and annual basis. The anomalies are calculated as a percent deviation from the 1995 – 2019 mean speed at 100 m above ground level for the calendar period. The latest Wind Trends dataset is derived using the ERA5, a contemporary global reanalysis dataset. For more information about customized analyses for your project portfolio, data or subscription options, please contact us at renewableenergyservices@ul.com.

[Download](#) index values for even more wind power producing countries!



According to ERA5 reanalysis data, global wind speeds in 2021 were slightly below the long-term norm (1995-2019). The global deficit was primarily driven by below-normal wind speeds across Europe, although North America and South America were below the norm as well. Other regions finished the year with a modest wind speed surplus (i.e., Asia, Africa & the Middle East, and Oceania).

North America

The wind speeds were near normal across North America as a whole. Above-normal wind speeds enveloped the capacity-rich western and central United States and Canada. Low wind speeds overspread much of the eastern U.S. and Canada, with the exception of the Canadian Maritimes (where mid-year wind speeds were well above the long-term norm for Newfoundland and Labrador, Nova Scotia, and southern New Brunswick). To the south, wind speeds were below the norm across much of Mexico, Central America, and the western Caribbean; winds were well above the long-term norm across the eastern Caribbean.

South America

South America finished the year with below-normal

wind speeds for many wind capacity-rich areas. Of the top five counties in the region with the highest installed capacity (representing about 99% of the region's MW), all experienced annual wind speeds below the long-term norm. Brazil had a strong start to the year with a moderate wind speed surplus in the northeast in Q1, however this was short lived and a deficit set up across most wind farms for the remainder of the year. Uruguay and Argentina also had a brief wind speed surplus in the second and third quarters, respectively. Winds were above the norm across northern portions of the region (e.g., Venezuela and the ABC islands), but the relatively low capacity here does little to sway the regional wind index.

Europe

For the first time since 2018, the annual wind index for Europe dropped below the long-term norm. Wind speeds were above normal across far northern and southern areas of Europe, with much of the area in between at a deficit. Below-normal wind speeds prevailed across Western Europe and Central Europe for much of the year. In fact, the following countries had below-normal wind speeds for each quarter of 2021: the UK, Denmark, the Netherlands, Ireland, and Belgium. Wind speeds were moderately above the

long-term across the Baltic States, while particularly strong wind speeds overspread much of the eastern Mediterranean region. Turkey and neighboring Armenia were the only countries in the region with above-normal wind speeds for each quarter in 2021.

Africa and the Middle East

Africa and the Middle East finished the year with wind speeds above the long-term norm. While South Africa dominates this market in terms of capacity and thus (usually) drives the regional index, Egypt greatly affected the annual wind index for 2021 with strongly above-normal wind speeds in the first half of the year. The wind speeds across South Africa remained near normal throughout the year.

Asia

Asia finished the year with near-normal wind speeds. The global leader of installed wind capacity, China, had an annual wind index of just above the long-term — although the wind index varied greatly at local level. Above-normal wind speeds were sustained for much of the year in the capacity-rich northern China and in the area surrounding Beijing (particularly Shandong, Hebei and Shanxi provinces). In contrast, wind speeds across much of southern

and southeastern China remained below the long-term norm (with the exception of Yunnan province). Annual wind speeds were again below the long-term norm for much of India, although wind speeds across some areas in the north and northeast were above normal towards the end of the year (i.e., September, November, and December). Elsewhere, wind speeds were above the norm across Japan and much of Mainland Southeast Asia — while below-normal wind speeds prevailed for much of the year across Taiwan.

Oceania

Wind speeds were above the annual long-term norm across Oceania. Strongly above-normal wind speeds across capacity-rich areas the third quarter countered normal to below-normal wind speeds throughout the remainder of the year. Australia finished another year with above-normal wind speeds (the fifth of the past six years), while New Zealand was again at a deficit (totaling three of the past six years).

[Download](#) index values for even more wind producing countries!



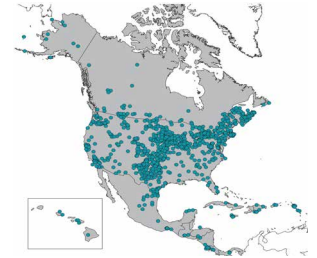
North America

Below normal:

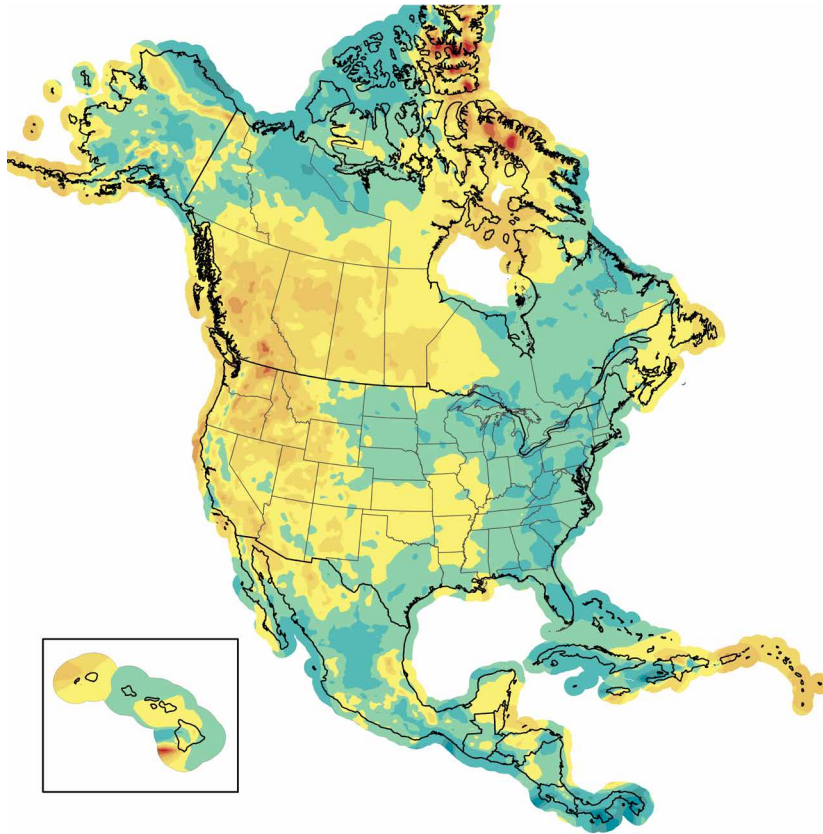
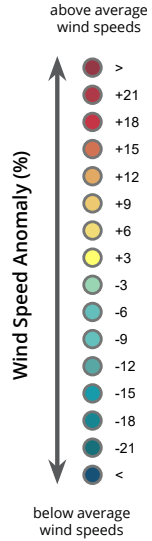
- Northeast, U.S.
- Eastern Ontario, CAN
- Quebec, CAN
- Western Caribbean
- Mexico
- Central America

Above normal:

- Canadian Maritimes
- Western Canada
- Western U.S.
- NE, OK and northern Texas, U.S.
- Eastern Caribbean



Wind plant locations source:
www.thewindpower.net



2021 | Annual

South America

Below normal:

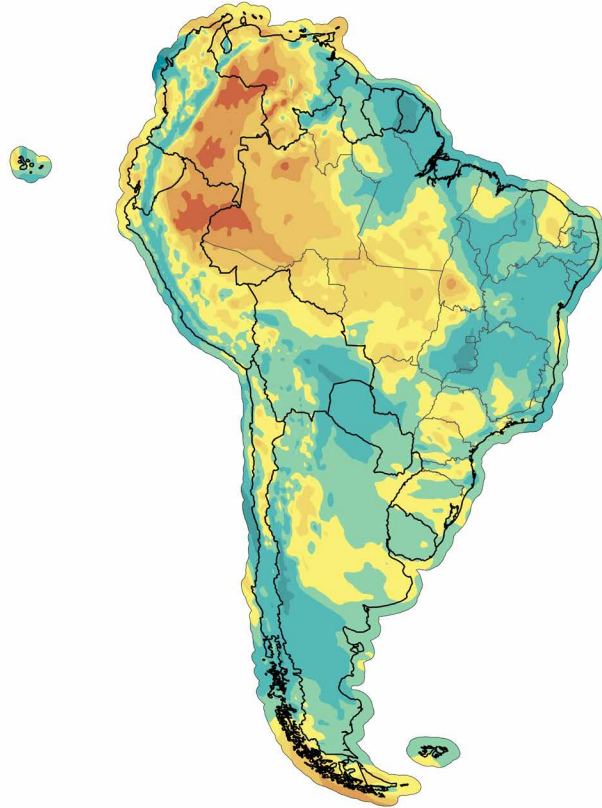
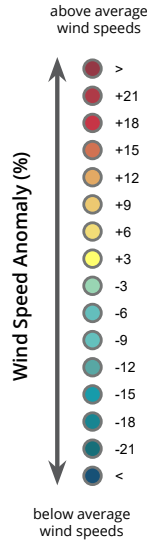
- Brazil
- Argentina
- Chile
- Uruguay
- Peru

Above normal:

- Venezuela
- ABC Islands
- Guajira Peninsula, COL



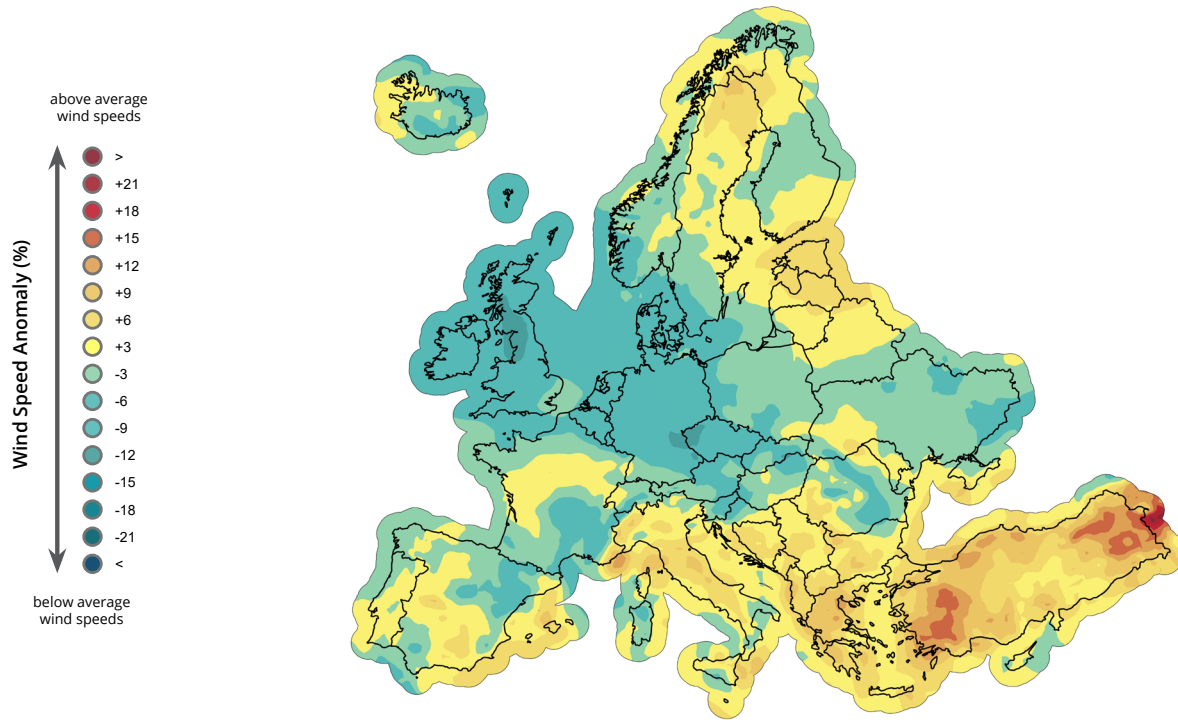
Wind plant locations source:
www.thewindpower.net



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Global wind speed performance

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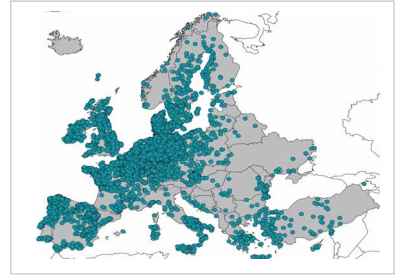




Europe

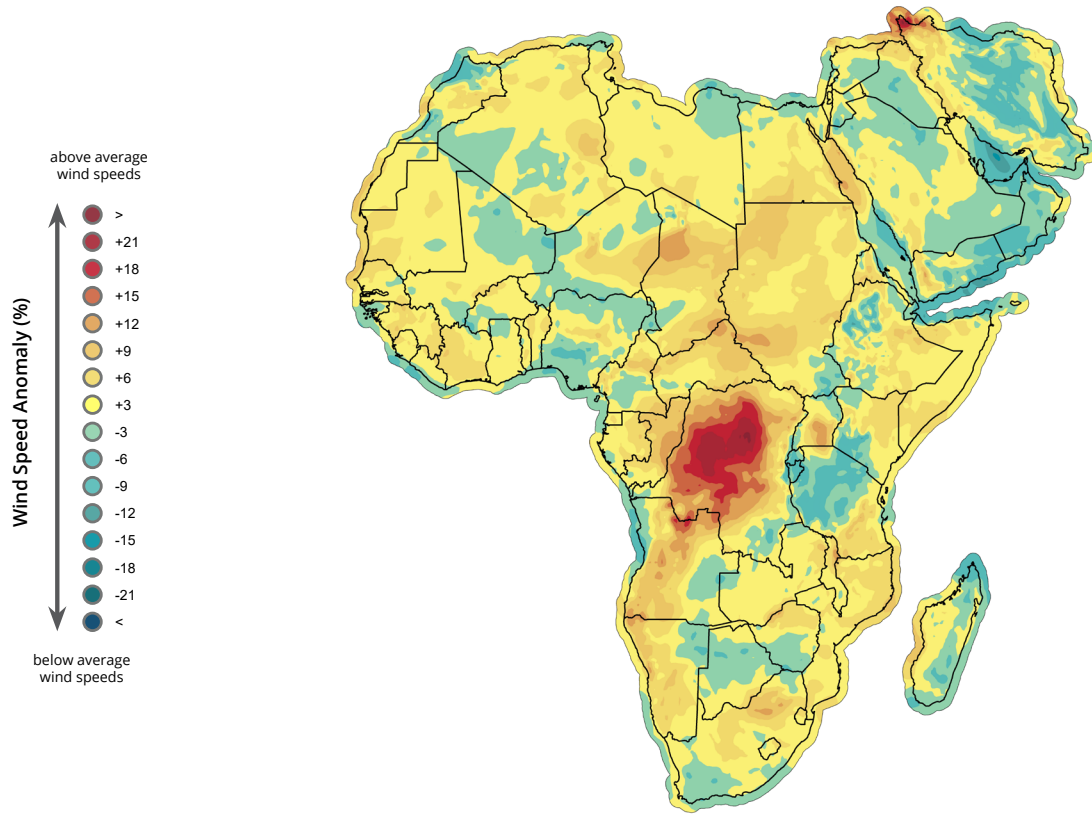
- Below normal:**
- Western Europe
 - Central Europe
 - Poland
 - Ukraine

- Above normal:**
- The Baltic States
 - Eastern Mediterranean
 - Northern Sweden



Wind plant locations source:
www.thewindpower.net





2021 | Annual

Africa / Middle East

Below normal:

- Coastal Tunisia and Morocco
- Seychelles
- South-central South Africa

Above normal:

- Egypt
- Coastal West Africa
- Canary Islands
- Central Uganda



Wind plant locations source:
www.thewindpower.net

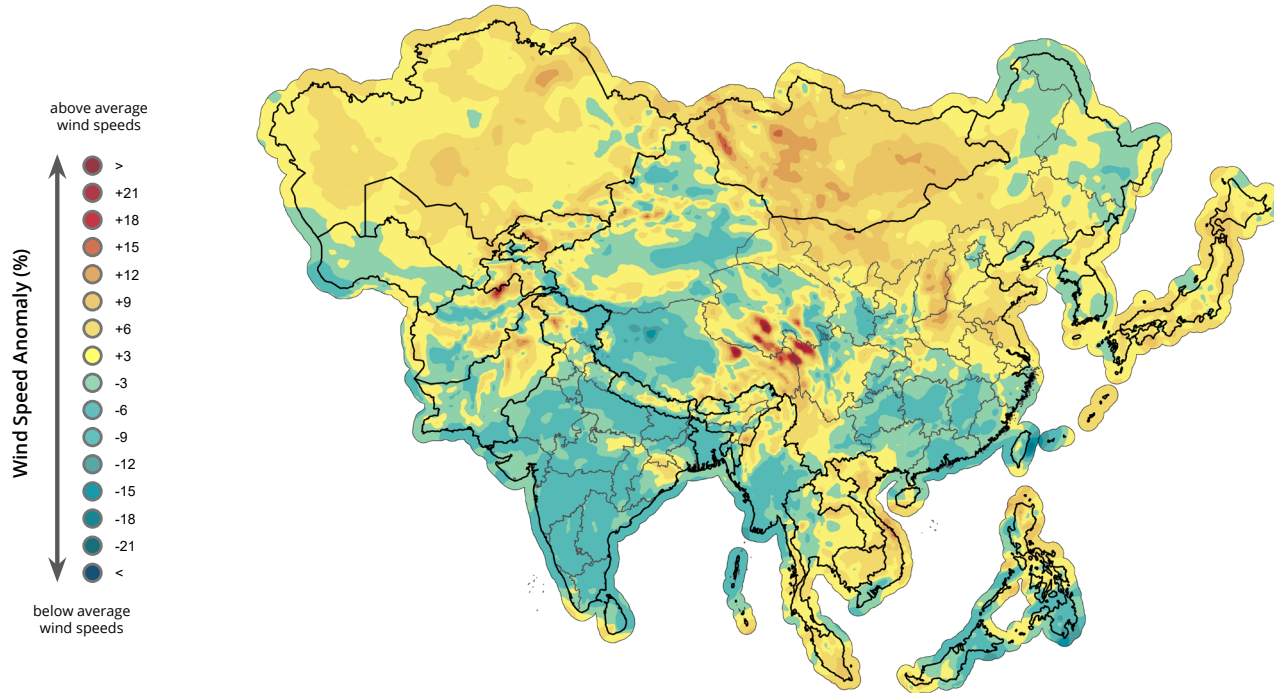


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Asia

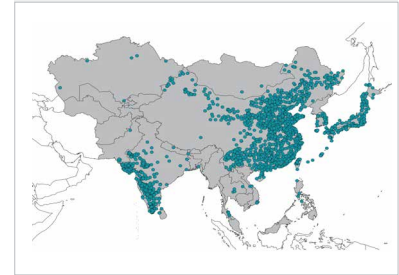


Below normal:

- Southern and Southeastern China
- India
- Taiwan
- Southern Vietnam

Above normal:

- Northern China
- Northern and Central Vietnam
- Southern and Eastern Thailand
- Japan
- Northern Philippines



Wind plant locations source:
www.thewindpower.net



Oceania

Below normal:

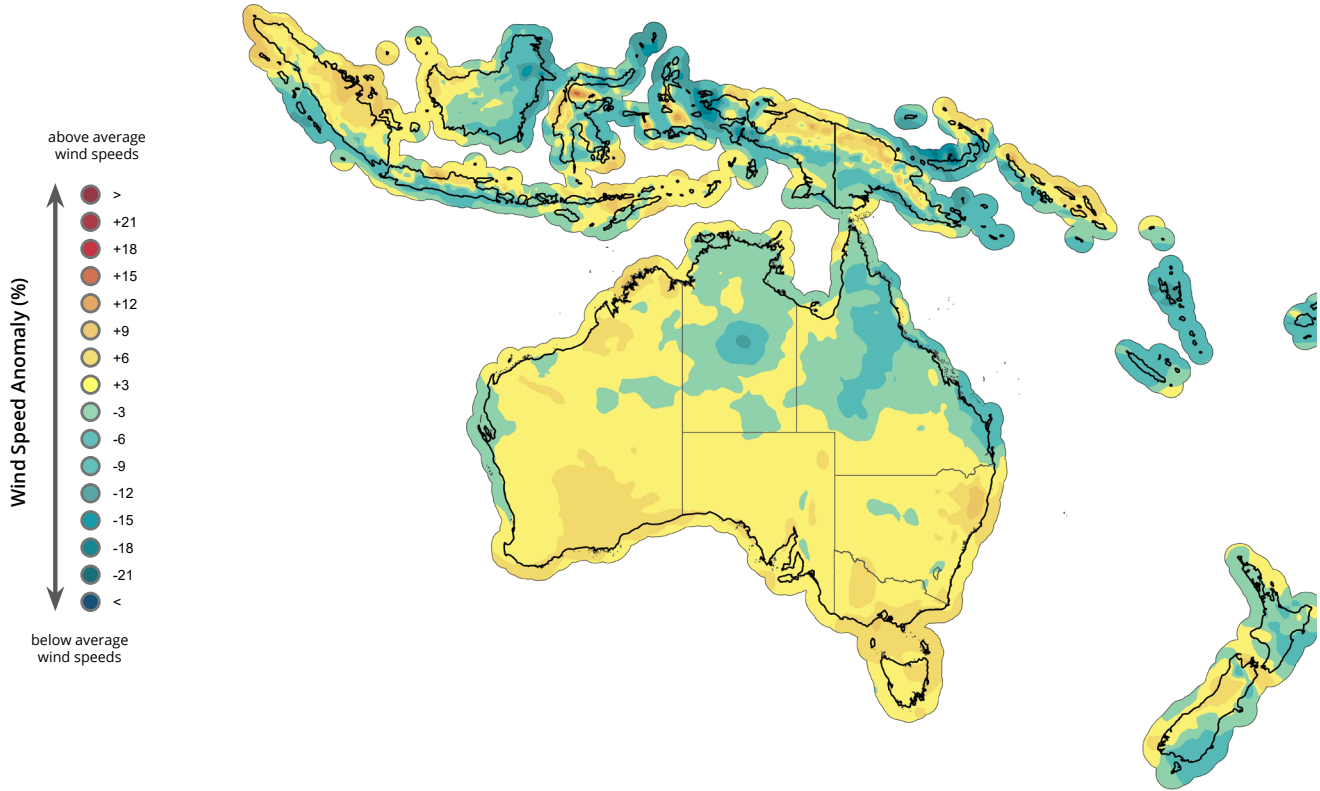
- Southern New Zealand
- New Caledonia
- Fiji

Above normal:

- Southern Australia
- Cook Strait, NZ



Wind plant locations source:
www.thewindpower.net



Locations	Jan	Feb	Mar	Q1	Apr	May	Jun	Q2	Jul	Aug	Sep	Q3	Oct	Nov	Dec	Q4	ANNUAL
North America	-4.9	-1.5	8.1	0.5	-3.4	-1	-4	-2.9	-6	4.4	3.7	0.7	-1.6	0.3	-6.1	1.6	-0.1
USA	-4.2	-1.3	7.6	0.7	-3.3	-1.5	-4.7	-3.2	-6.5	5.7	3.6	0.9	0.2	0.2	7.5	2.6	0.2
Canada	-12.1	-2.6	14.2	-0.4	-6	-3.7	9.7	-0.5	-2.8	-1	8.6	1.9	-11.8	1.5	2.1	-2.7	-0.6
Mexico	-3.7	-4.1	5.8	-0.7	0.2	9	-18.3	-2.3	-5.6	-3.8	-1.9	-3.9	-9.9	-0.5	-8.7	-6	-3.3
South America	7.4	-5.4	-0.3	0.7	1.9	-1	-4.7	-1.7	-2.3	-0.2	-3.1	-1.8	-3.6	-7.7	-4.6	-5.5	-2.2
Brazil	10.2	-5.8	1.2	2	3.5	-2.5	-5.9	-2.2	-3.2	1	-4.2	-2.1	-5.7	-10.5	-4.6	-7	-2.5
Argentina	1.1	-4.9	-3.1	-2.2	-4.7	0.6	-4.1	-2.8	3.9	1.3	-1	1.4	4.3	-4.5	-10.2	-3.6	-1.8
Chile	-0.1	-4.2	-2.8	-2.4	-0.8	-0.1	-5.1	-2.1	-8.8	0.5	-0.7	-2.8	3.1	-2.9	-2.9	-1.1	-2.1
Europe	-1.7	1.3	-3.8	-1.5	-4.4	7.9	-10.7	-2.4	-2.9	0.6	-9	-4	3.2	-5.1	-1.1	-1	-2.1
Germany	-8.9	-7.8	-4.7	-7.2	1.6	17.3	-19.7	0.1	-8.6	6.1	-14.7	-6.1	5	-10.6	-12.7	-6.3	-5.1
Spain	11.7	8.2	-10.7	3.1	-15.1	1.5	-3.5	-6.2	3.7	-2.8	-7.6	-2.2	-7.1	0.2	7.6	0.8	-0.9
France	-2.0	5.3	-1.5	0.6	-2.5	21	-16.4	1	6.2	6.2	-14	-0.9	3.1	-16.8	-2.7	-5.6	-1.4
United Kingdom	-18.5	14.9	2	-0.7	-21	-8	-6	-12	-28.6	-16.4	-16.2	-20.1	2.2	3	-11.6	-2.4	-7.9
Italy	19.9	-10.3	-10.9	-0.6	-4.3	13.2	-8.7	0.3	1.4	7.9	-13.4	-1.8	11.7	-2	14.3	7.8	1.5
Portugal	10.9	15.4	-9.6	5.4	-23	4.8	0	-6.6	6.7	-7.7	4.4	1.1	-5.9	-5.9	13.6	0.7	0.4
Denmark	-15.1	-3.1	-3.4	-7.4	4.5	-6.9	-13.7	-5.2	-4.3	5.1	-13.6	-4.6	3.1	-5.5	-9.6	-4	-5.4
Ireland	-15.9	15.8	-0.1	-0.2	-15	-1.8	-4.6	-7.3	-25.7	-12.5	-17.2	-18.3	-4.4	-7.7	-2.4	-4.8	-7.1
Africa / Middle East	3.8	0.5	1.8	2.1	-3.7	2.3	3.4	0.7	4.4	-3.5	2.9	1.3	5.3	-3.6	0.6	0.8	1.2
South Africa	-0.1	1.6	-1.1	0.2	-9	4.4	2.3	-0.5	5.3	-3.2	5.3	2.5	5.4	-3.2	-1.5	0.1	0.6
Morocco	6.7	-4.6	-7.1	-1.8	-13.3	4.8	1.3	-2.6	9.3	-3.8	-4	0.5	8.6	0	0	3.4	-0.1
Egypt	3.1	11.7	11.8	9.1	9.6	7	7.5	8	4.5	-3.7	6.5	2.4	9	-7.7	-4.3	-0.8	4.5
Asia	10.4	3.4	-3.8	2.9	-4.6	5	-1.8	-0.5	1.2	-2.4	-3.7	-1.8	2	7.8	-0.2	3.3	0.9
China	12.0	4.2	-4.4	3.4	-4.4	6.6	-1	0.3	1.8	-2	-4.5	-1.6	2.9	8.3	0.2	3.9	1.5
India	-0.9	-3.9	0.7	-1.6	-7.7	-6.9	-8.2	-7.8	-2.6	-7	3.3	-2.8	-4.4	4.6	-4.4	-1.6	-3.8
Thailand	10.4	5.2	-6.5	3.3	-12.5	-7.8	10.5	-1.8	2.5	-14.3	-7.1	-6.2	1.4	5.3	9.9	6.3	0.7
Ind, Aus, Oceania	3.6	-0.1	-2.5	0.4	-1.1	3.5	-1.2	0.4	11.3	1.7	4	5.6	-3	-0.2	-1.7	-1.5	1.3
Australia	3.6	1	-1.9	0.9	-1.6	3.4	-0.8	0.4	12.7	1.1	3.3	5.6	-1.8	0.6	-2	-0.9	1.6
New Zealand	4.7	-18.3	-11.4	-8	1.7	3.6	-4.5	0.3	-3.7	10.9	16.4	8	-14.8	-9.5	0.2	-9	-2.2
World	3.5	1.3	-0.8	1.1	-4	4.1	-4.6	-1.6	-1.5	0.1	-3.1	-1.6	1.2	1.9	0.8	1.3	-0.2

2021 | Annual

Wind index

The wind index represents the average wind speed anomaly across all plants of the country or region in production by the end of 2020. The anomalies are calculated as a percent deviation from the 1995 – 2019 mean speed at 100 m above ground level for the calendar period, and are weighted by the location and rated capacity of wind projects.

The wind project details have been obtained from [Windpower Monthly Intelligence](#).

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