



2021 | Q1 Global

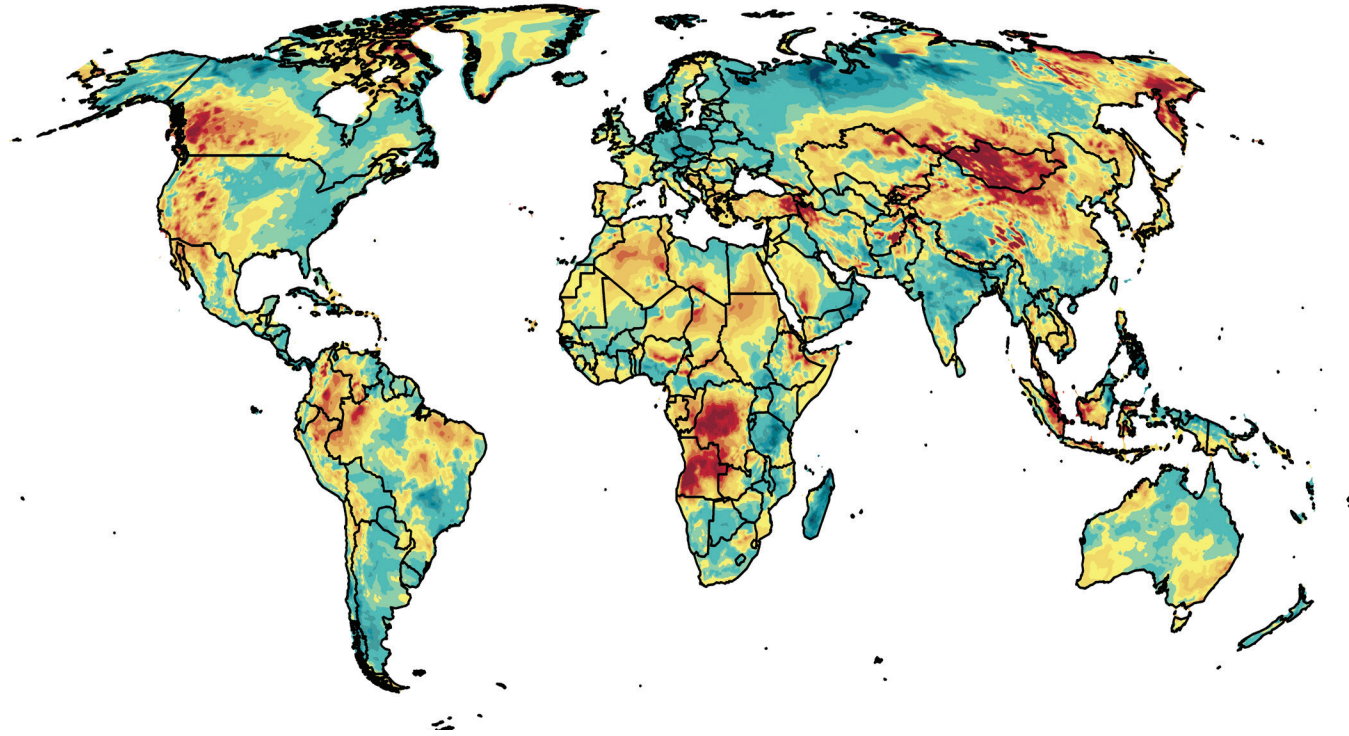
Wind Trends

Global wind speed performance

2021 | Q1

Global

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.



Wind Trends
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According to ERA5 global reanalysis data, wind speeds in the first quarter of 2021 were above-normal relative to the long-term, first-quarter norm (1995-2019). Most regions experienced near-normal to above-normal wind speeds, with the exception of Europe, where wind speeds dipped below the long-term norm.

North America

Wind speeds fell to near-normal across North America. In contrast to the previous quarter when slightly above-normal wind speeds enveloped much of the region, the wind speed surplus in Q1 2021 was focused in local areas of moderately to strongly above-normal wind speeds e.g., the Pacific Northwest (USA), British Columbia, Alberta and the Prairie Provinces of Canada, and parts of northern Mexico. In January and February, the USA and CAN experienced a pattern of below-normal speeds in the west and above-normal speeds in the east, which is reflected in the quarterly-averaged speeds. By March the pattern shifted; wind speeds rose well above the long-term normal across much of Texas (3 to 15%),

Mexico (3 to 18%), the Northeast USA (3 to 21% or more) and nearly all of Canada (especially in eastern Ontario and the Canadian Maritimes, where winds were 12 to 21% or more above the long-term norm). Wind speeds were sustained at above-normal across much of Hawaii throughout the quarter. Strongly-above normal wind speeds overspread the Bahamas and the eastern Caribbean in February (18 to 21% or more), but moderated by March (6 to 12 %).

South America

The wind speed index for South America rose to near-normal in the first quarter of 2021, largely driven by wind speeds in excess of the long-term norm across northeast Brazil (where winds were especially strong in January at 12 to 18% above the norm). However, 4 of the 5 counties with the region's highest installed wind capacity finished the period with a wind speed deficit. Northern Chile, Argentina, and Uruguay experienced above-normal wind speeds in January and then dipped below the norm for the remainder of the quarter. Quarterly wind speeds across Peru were

slightly below normal, despite localized areas of strongly-above normal winds in February (in excess of 21%).

Europe

The wind speeds across much of Europe fell below the long-term norm in the first quarter of 2021. Almost three-quarters of the region's nations rounded out the period with wind speed indices below their long-term norm. The largest change in the wind speed index from the previous quarter occurred across northern and central Europe. Wind speeds fell from moderately above the norm in the final quarter of 2021 across Scandinavia (0 to 12%), to below the norm in Q1 of 2021 (0 to -12%). Meanwhile, a wind speed deficit across Central Europe in the previous quarter intensified (3 to 18% below the norm). These conditions were not static throughout the period. Rather, the pattern of wind speed departures shifted considerably throughout the quarter. In January, a gradient in the wind speed index established from south to north. Strongly above-normal wind speeds extended

across all of Southern Europe (up to 18%) and waned northward, giving way to strongly below-normal winds across parts of Scandinavia, the North Sea, and the United Kingdom, where wind speed departures were in excess of 21% below the norm. In February, wind speeds rose well above the norm across far western areas, e.g. the Iberian Peninsula, France, Ireland, and the United Kingdom (6 to 21 %). The quarter finished up at a mirror image to how it began, with strongly above-normal wind across Scandinavia (up to 21%) and a diminishing wind speed index to the south.

Africa and the Middle East

Africa and the Middle East finished the quarter at slightly above the long-term, first-quarter wind speed, a welcomed departure from the previous quarter's deficit. Strong localized wind speed departures established by the end of the period, including a gradient in wind speeds across the East African Islands and across continental East Africa. (Continued on next page.)



Africa and the Middle East (cont.)

Off of the mainland, moderately above-normal winds established across the Seychelles with below-normal winds across Mauritius and Reunion. Meanwhile, a wind surplus spread across Somalia and eastern Ethiopia, with a deficit to the south across central Kenya and Tanzania. Elsewhere, wind speeds remained near-normal across South Africa as a whole while the wind index increased considerably from the previous quarter across key wind power producing areas of Egypt (namely the Red Sea Coast).

Asia

Asia started the year with a surplus of winds in the first quarter, a departure from the trend of the previous two years. The wind speed surplus was driven by strongly above-normal wind speeds in China, which has over 85% of the region's wind capacity. Large swaths of northern and northeastern China experienced strong winds in excess of the long-term norm, particularly in February (9 to 21%). These above-normal winds overspread Japan and South Korea during the

middle of the quarter as well, although a deficit set over northeast Asia in by the period's end. Southeast China and Taiwan remained at a deficit for the majority of the quarter. Wind speeds across many of the wind power producing areas of India remained consistently below-normal throughout Q1 2021, although central portions of Karnataka and Tamil Nadu finished the quarter with above-normal winds in March (6 to 18%). Southeast Asia ushered in the new year with strongly above-normal wind speeds in January (up to 21%), which dissipated later in the quarter (except for central Vietnam, where wind speeds bounced back at 6 to 15% above the norm).

Oceania

Wind speeds across Oceania declined to near-normal in the first quarter of 2021. Above-normal conditions across key areas of Australia at the beginning of the period began to wane by February. The majority of installations in Australia were at a deficit in March, except for those in New South Wales, where winds were 12 to 21% above the norm. New Zealand rounded out the

quarter with below-normal wind speeds overall, despite above-normal conditions across the South Island and in the vicinity of the Cooke Strait early on in January. Wind speeds across key areas of Indonesia (e.g., central Java and southwest Sulawesi) continued to climb above the long-term norm.

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North America

Below normal:

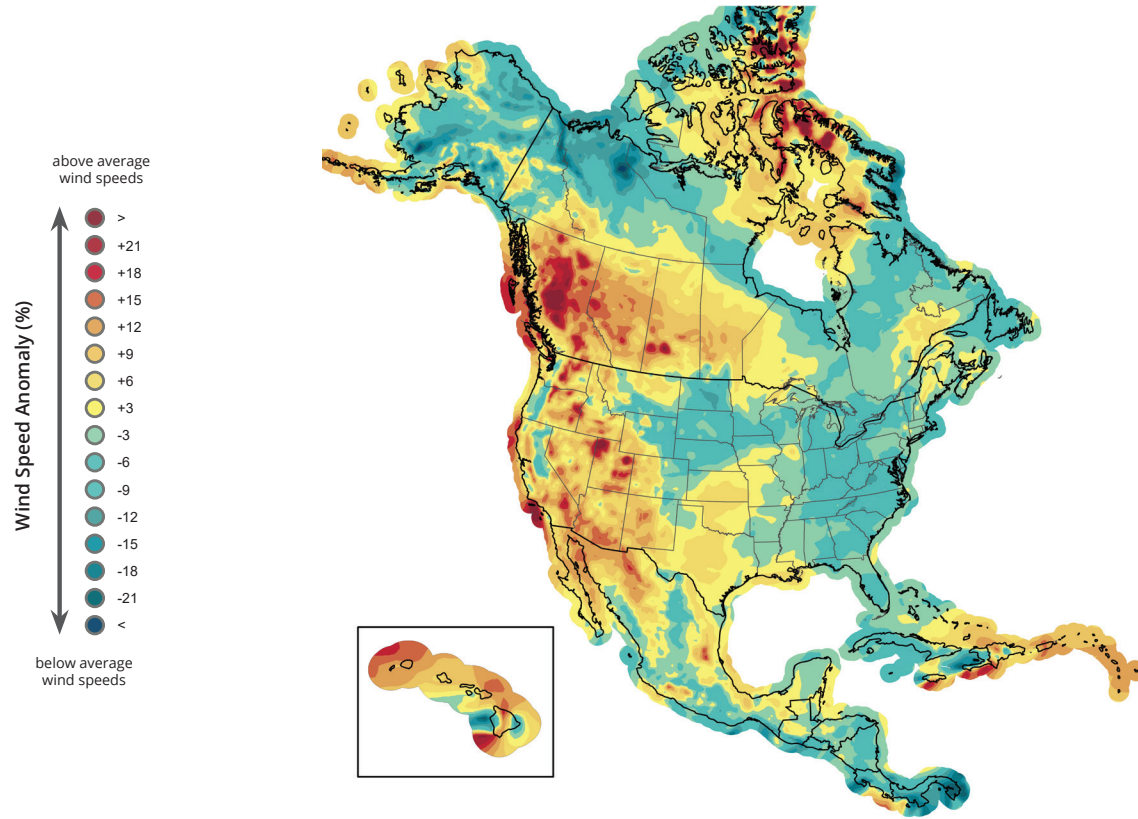
- Northeast, USA
- Canadian Maritimes
- Midwest, USA
- Southeast ON, CAN
- Upper Great Plains, USA
- Central America

Above normal:

- Hawaii
- Western Canada
- Pacific Northwest, USA
- Southwest, USA
- Eastern Caribbean



Wind plant locations source:
www.thewindpower.net



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South America

Below normal:

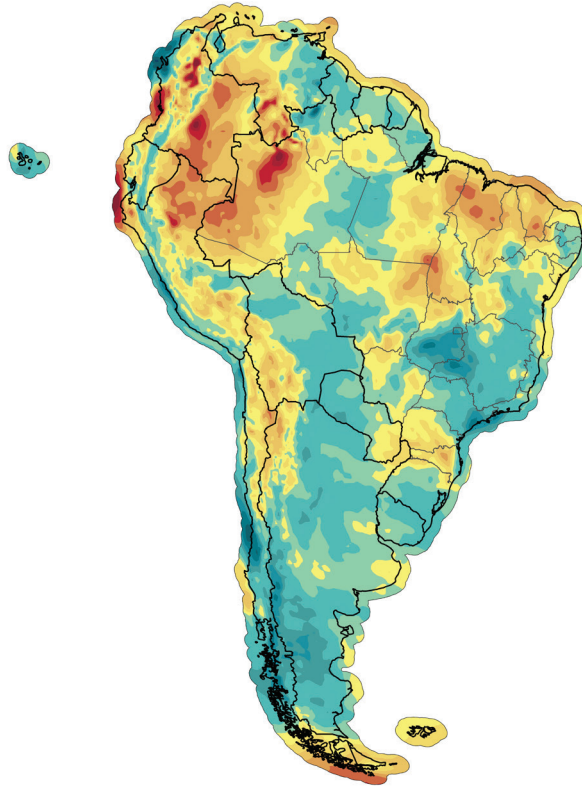
- Argentina
- Southern Chile
- Uruguay

Above normal:

- Coastal Northeast Brazil
- Coastal Northeast Peru
- Guajira Peninsula, COL
- ABC Islands



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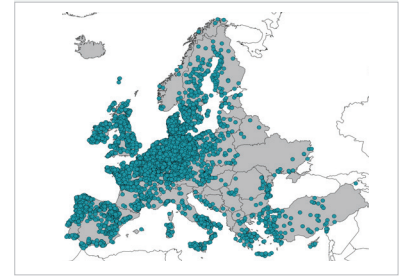
Europe

Below normal:

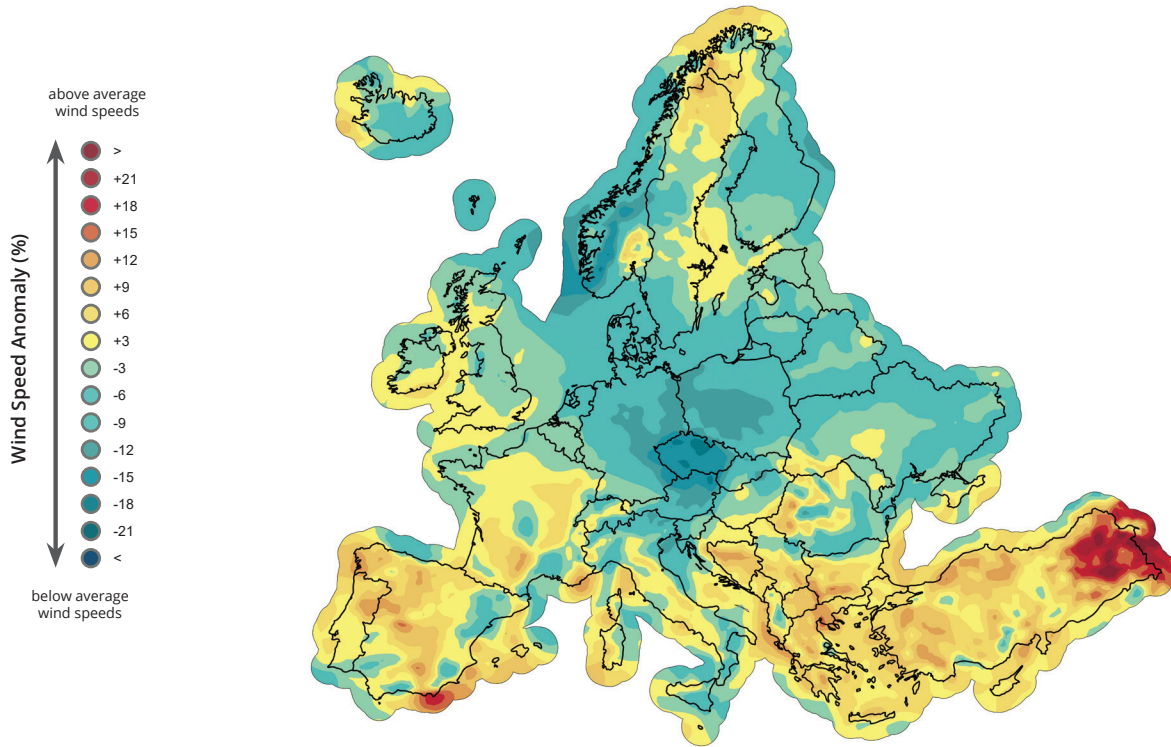
- Northern Europe
- Central Europe

Above normal:

- Balkans
- Turkey
- Central Spain
- Portugal



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Africa / Middle East

Below normal:

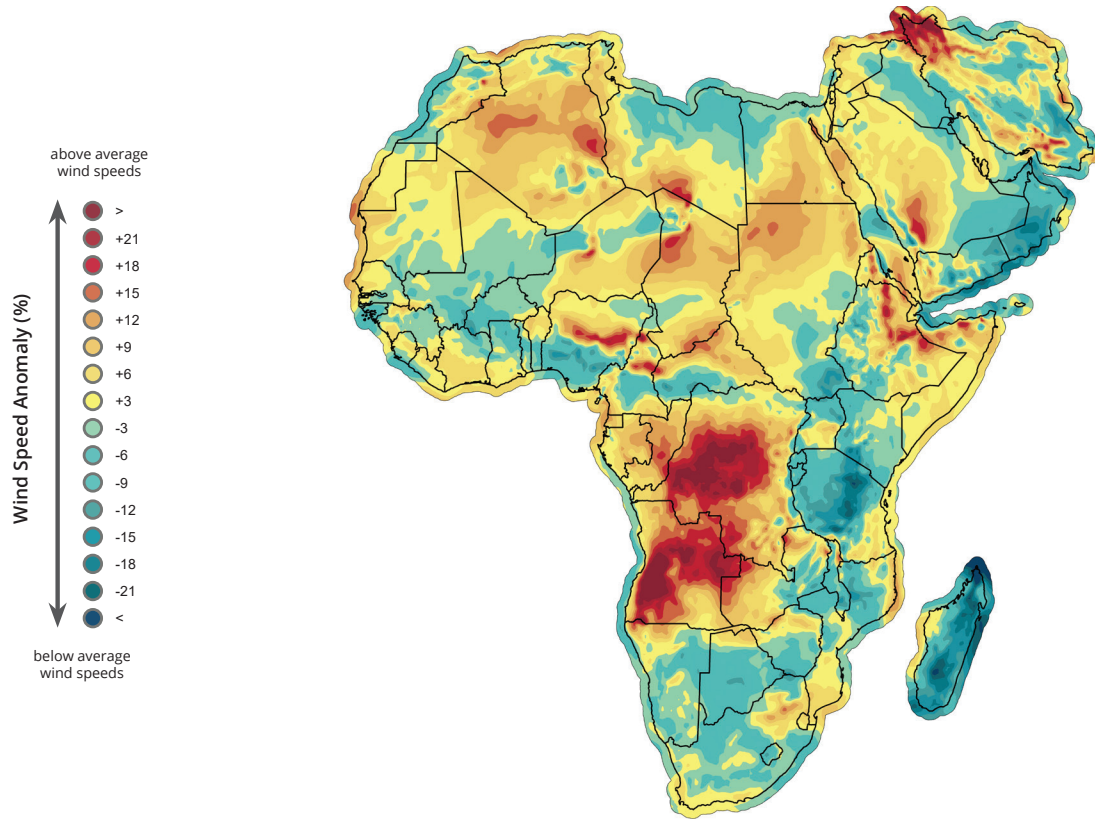
- Coastal Morocco
- Canary Islands, ESP
- Central Kenya
- Central Tanzania
- Central South Africa

Above normal:

- Algeria
- Western Sahara
- Cape Verde
- Red Sea Coast, EGY
- Northwest Iran
- Seychelles



Wind plant locations source:
www.thewindpower.net



above average
wind speeds

Wind Speed Anomaly (%)

below average
wind speeds

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Below normal:

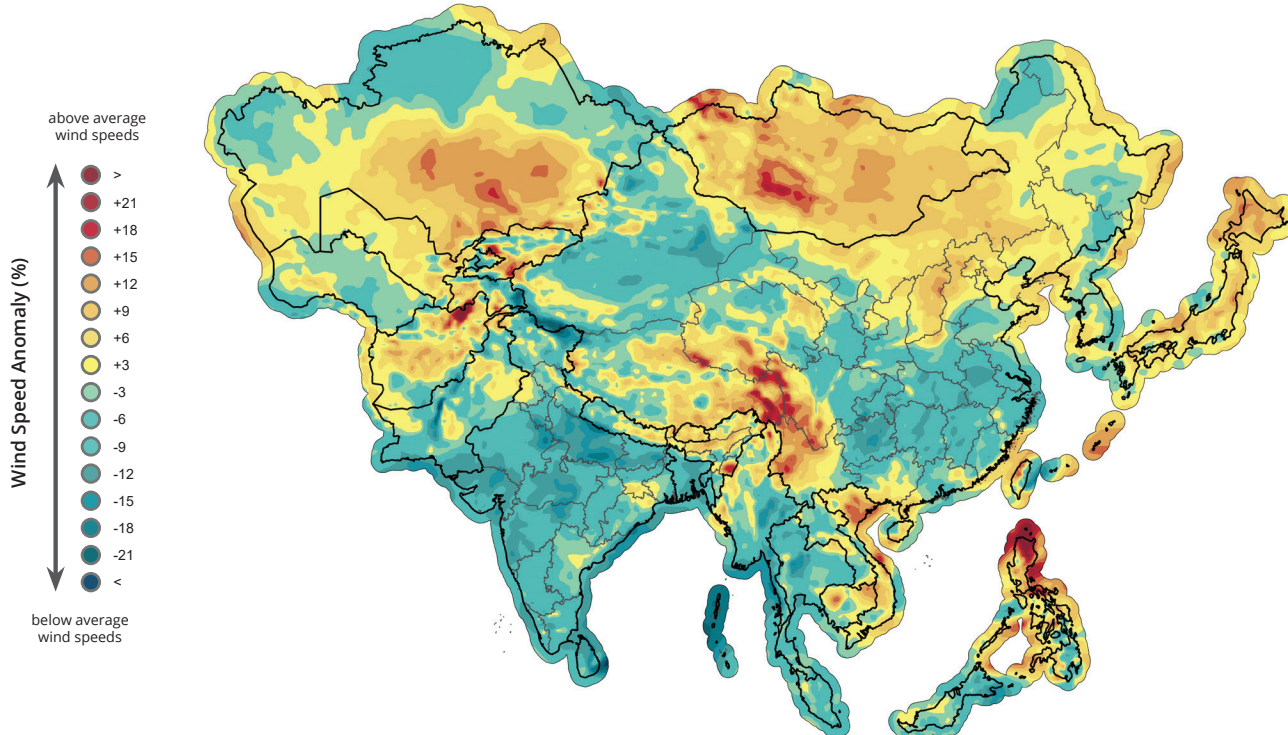
- India
- Southeast China
- Taiwan
- Pakistan

Above normal:

- Northern China
- Japan
- Thailand
- Central Vietnam



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www.thewindpower.net



Oceania

Below normal:

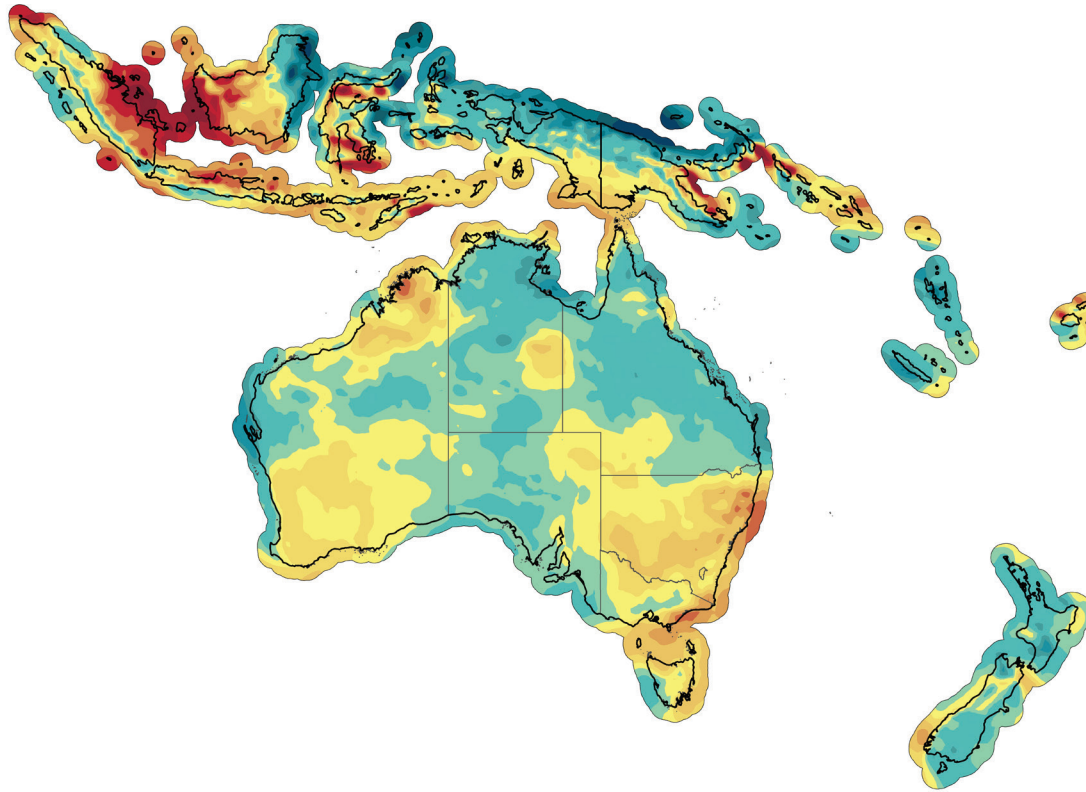
- New Zealand
- New Caledonia
- South-central Australia

Above normal:

- Southwest and Southeast Australia
- Indonesia

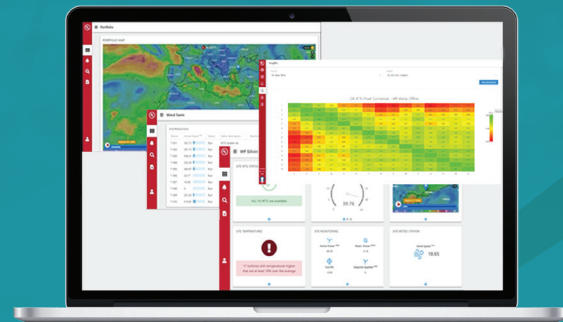


Wind plant locations source:
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Locations	Jan	Feb	Mar	Q1	Apr	May	Jun	Q2	Jul	Aug	Sep	Q3	Oct	Nov	Dec	Q4	ANNUAL
North America	-4.9	-1.5	8.1	0.5													
USA	-4.2	-1.3	7.6	0.7													
Canada	-12.1	-2.6	14.2	-0.4													
Mexico	-3.7	-4.1	5.8	-0.7													
South America	7.4	-5.4	-0.3	0.7													
Brazil	10.2	-5.8	1.2	2													
Argentina	1.1	-4.9	-3.1	-2.2													
Chile	-0.1	-4.2	-2.8	-2.4													
Europe	-1.7	1.3	-3.8	-1.5													
Germany	-8.9	-7.8	-4.7	-7.2													
Spain	11.7	8.2	-10.7	3.1													
France	-2.0	5.3	-1.5	0.6													
United Kingdom	-18.5	14.9	2	-0.7													
Italy	19.9	-10.3	-10.9	-0.6													
Portugal	10.9	15.4	-9.6	5.4													
Denmark	-15.1	-3.1	-3.4	-7.4													
Ireland	-15.9	15.8	-0.1	-0.2													
Africa / Middle East	3.8	0.5	1.8	2.1													
South Africa	-0.1	1.6	-1.1	0.2													
Morocco	6.7	-4.6	-7.1	-1.8													
Egypt	3.1	11.7	11.8	9.1													
Asia	10.4	3.4	-3.8	2.9													
China	12.0	4.2	-4.4	3.4													
India	-0.9	-3.9	0.7	-1.6													
Thailand	10.4	5.2	-6.5	3.3													
Ind, Aus, Oceania	3.6	-0.1	-2.5	0.4													
Australia	3.6	1	-1.9	0.9													
New Zealand	4.7	-18.3	-11.4	-8													
World	3.5	1.3	-0.8	1.1													

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Wind index

The wind index represents the average wind speed anomaly across all plants across the country or region in production by the end of 2021. 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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