

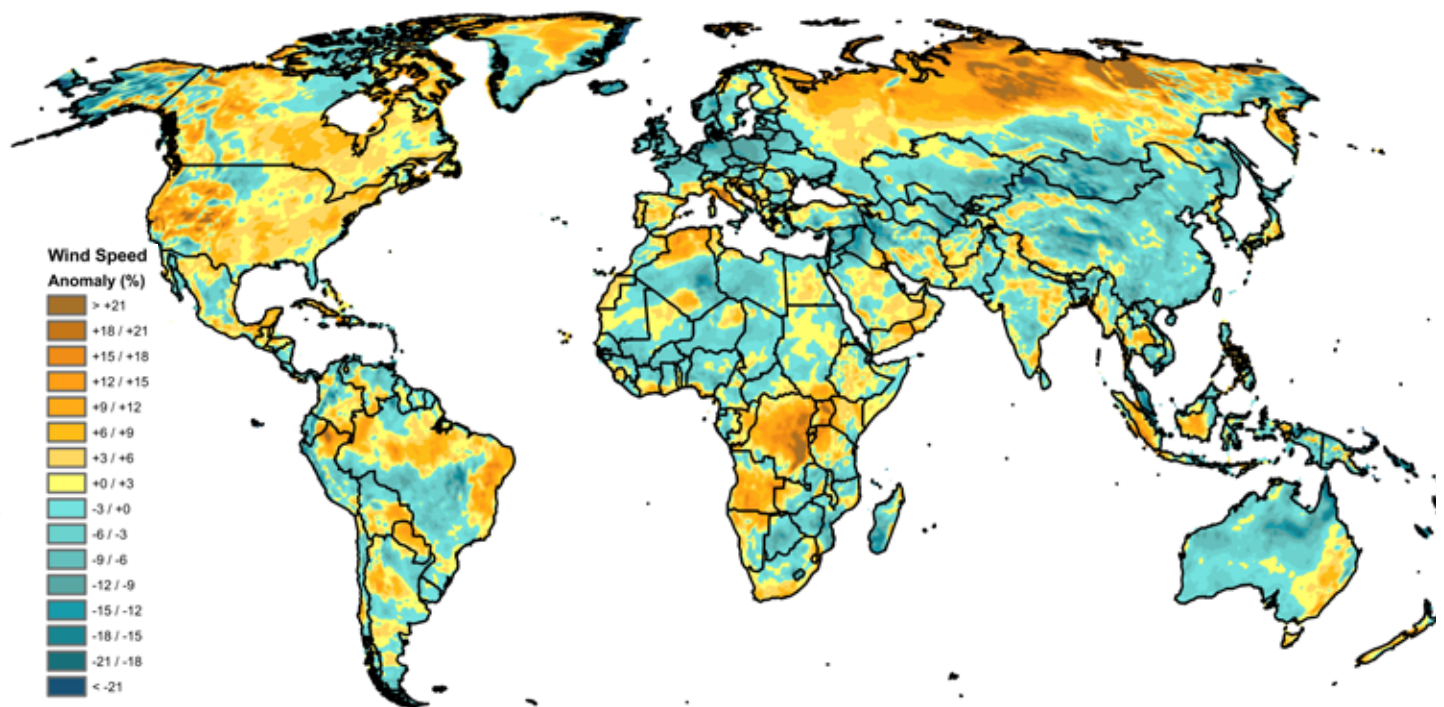
Wind Trends Bulletin

WIND SPEED PERFORMANCE

Introducing the 2017 Wind Trends Bulletin!

To reflect the recent acquisition of AWS Truepower by UL, we have changed the look of the Bulletin. We have also added a link to download even more countries in the 2017 Wind Index.

To subscribe to our monthly, quarterly and annual Wind Trends Bulletins [click here.](#)



GLOBAL

Q1 2017

In the first quarter of 2017, winds were above-normal relative to the long-term, first quarter norm (1988-2014) across much of the United States, Canada, and eastern Brazil. Winds were below-normal across most of Europe and Asia.

Above-normal winds overspread much of the United States since the previous quarter. Most wind-producing areas

experienced winds 0% to 3% above the norm. Some localized areas in the west were well above-normal (+15 to +18%). This was largely due to a strong start of the period, as these above-normal wind speeds subsided by March. Conversely, much of the east began the quarter at below the norm, with a strong finish to the quarter. *(Cont...pg 2)*

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The pattern of wind speed departures across much of Latin America remained unchanged. Wind speeds in eastern Brazil remained above-normal (+3% to +12%). Wind speed departures diminished to the south, with winds -3% to -6% below the norm in Uruguay and southernmost Brazil. Slightly above-normal speed departures increased across wind-producing areas of Argentina, and below-normal conditions waned across Chile.

Many key wind-producing areas of Europe experienced below-normal conditions in the first quarter. Wind speed deficits were strong over portions of Central Europe, Norway, and the United Kingdom (-12% to -15%). To the south, above-normal wind speeds were seen across the western Mediterranean region and the Iberian Peninsula. Wind speed departures in excess of +15% were experienced over in northern Italy and the Balkans, the island of Corsica, and Catalonia.

Wind speed deficits continue to prevail across many wind-producing areas of Asia. This includes much of western India, eastern China, and northern Japan. Eastern China and northern Japan rounded out the quarter with deficits approaching -15% due to strongly below-normal winds in March (-20% to -30%). Strongly above-normal winds at the beginning of the quarter allowed for much of southern Japan to finish the period at +3% to +6% above the norm.

Elsewhere, winds were below-normal across much of Oceania. Quarterly wind speed deficits approached -15% to -18% for the islands of New Caledonia and Vanuatu. To the south, winds in excess of +12% above the norm were realized in the vicinity of the Cook Strait, and above-normal wind speeds continued across Tasmania and southeast Australia (+3% to +12%). Overall, first quarter wind speeds were above the norm for wind-producing areas in Africa, although regional wind speeds varied. Above-normal wind speeds extended from the western Mediterranean into northern Africa, while strong deficits in the far eastern Mediterranean extended through northern areas of the Middle East.

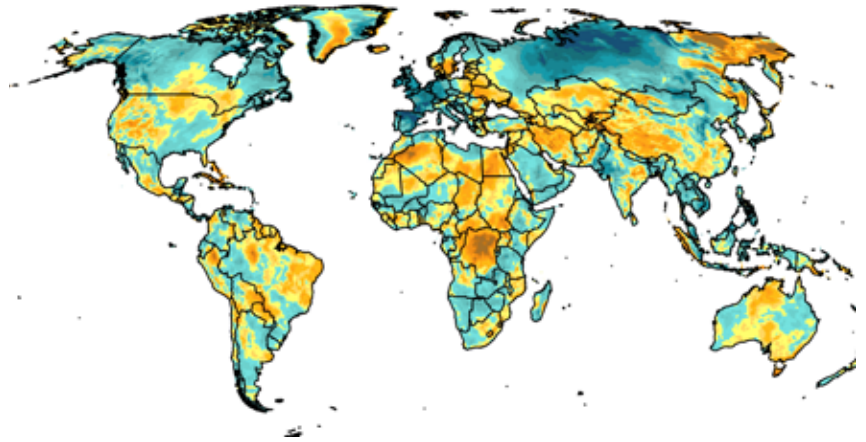


Figure 2: Q4 2016 Global Wind Anomaly Map



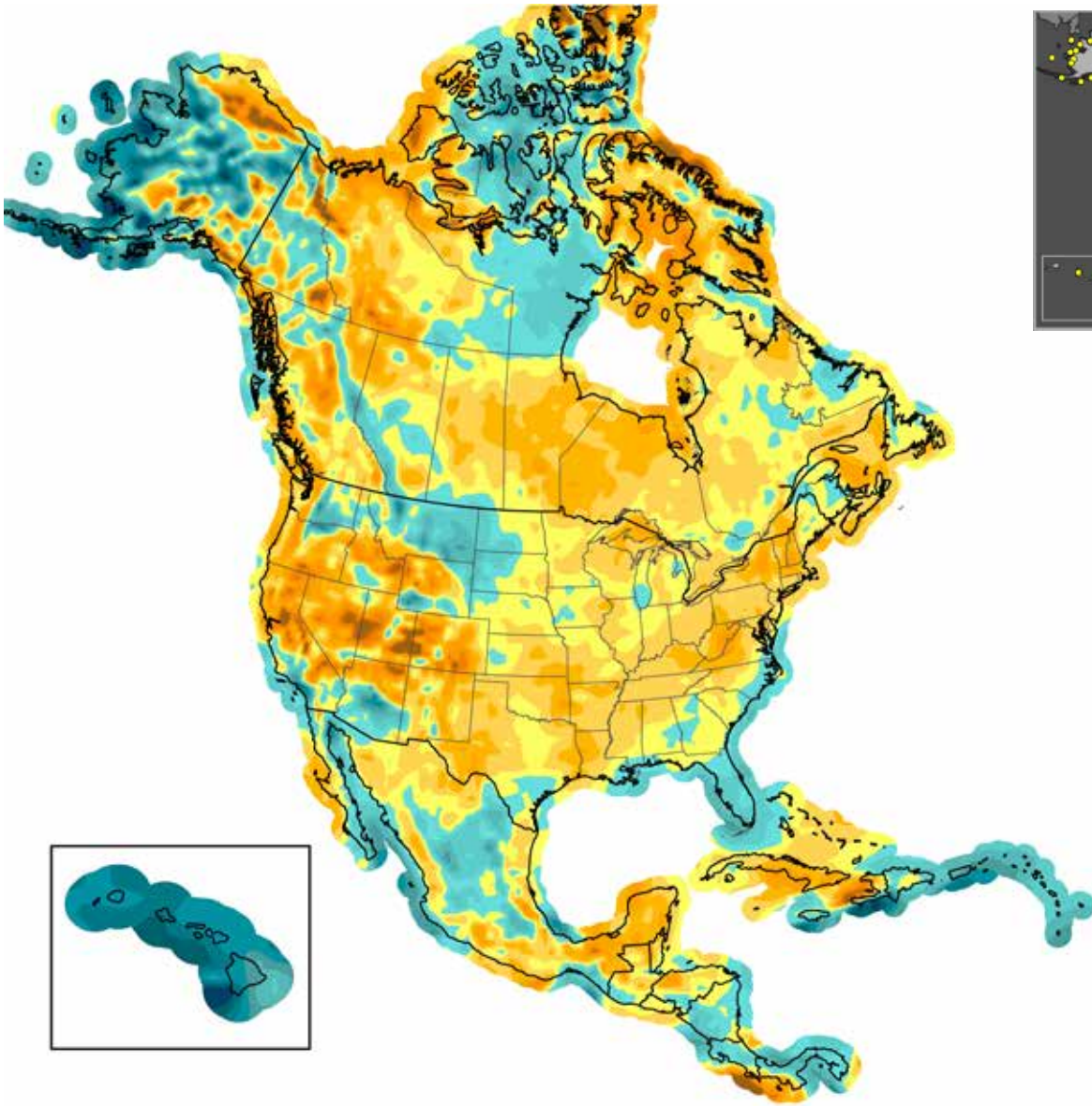
PERFORMANCE ENGINEERING

While renewable energy brings with it inherent variability in plant production, good economic performance of a project is not a matter of chance. We are committed to developing innovative evaluation methods to help understand plant performance, manage expectations of operational plants and identify opportunities for performance improvement.

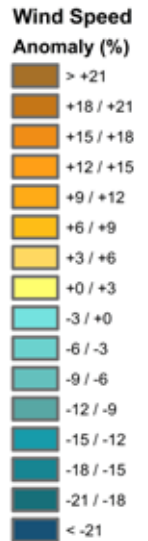
OFFERINGS: PERFORMANCE OPTIMIZATION · PERFORMANCE ANALYSIS
OPERATIONAL ENERGY ASSESSMENTS · POWER PERFORMANCE TESTING

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Wind plant locations source:
www.thewindpower.net



NORTH AMERICA

Q1 2017

Areas with below-average winds

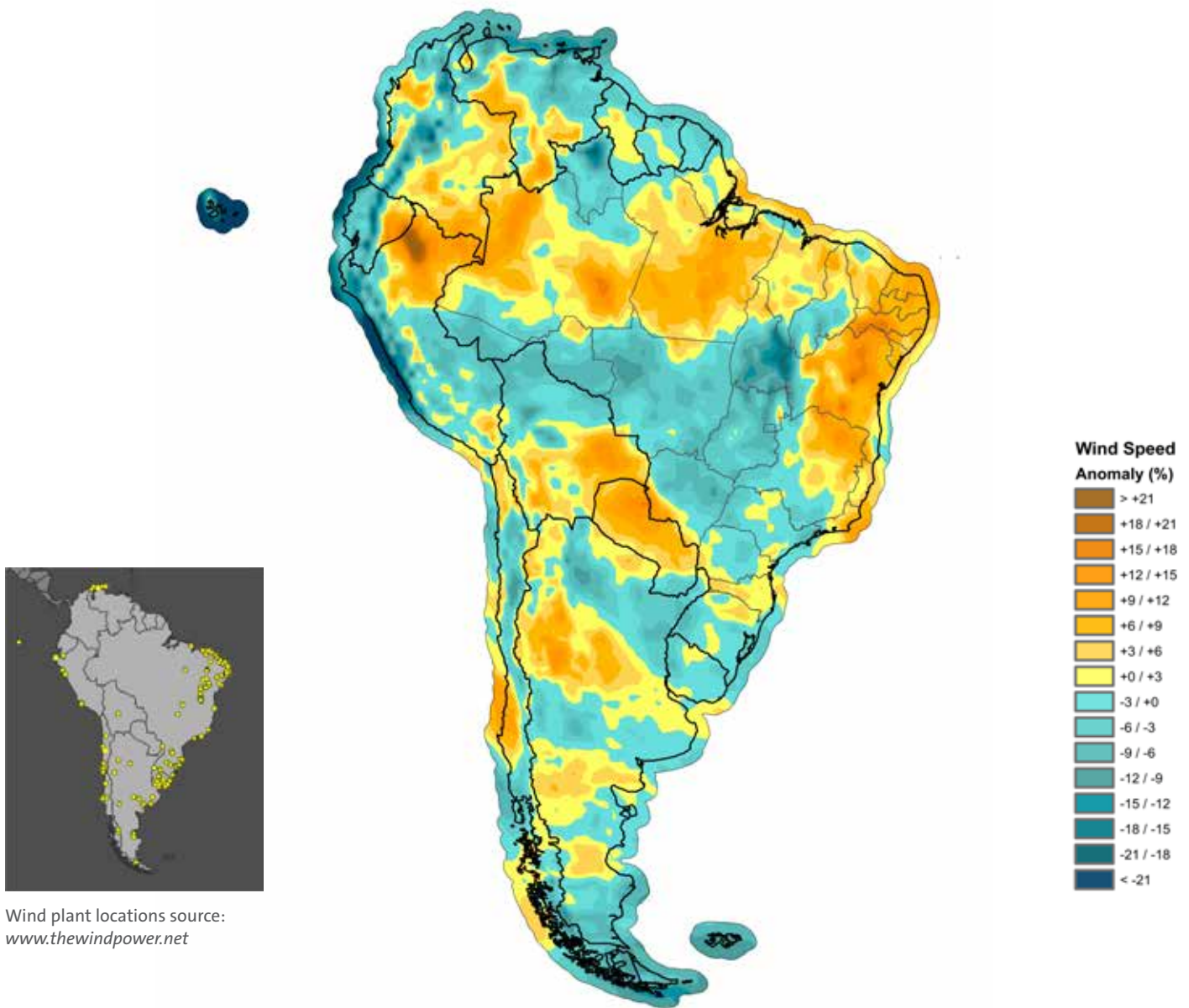
- Hawaii
- Southern California
- Southeast Washington
- Montana and eastern North Dakota
- Alaska

Areas with above-average winds:

- Northern California
- Southern and Central Great Plains
- Midwest
- Northeast

Wind Trends Bulletin

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Wind plant locations source:
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SOUTH AMERICA

Q1 2017

Areas with below-average winds

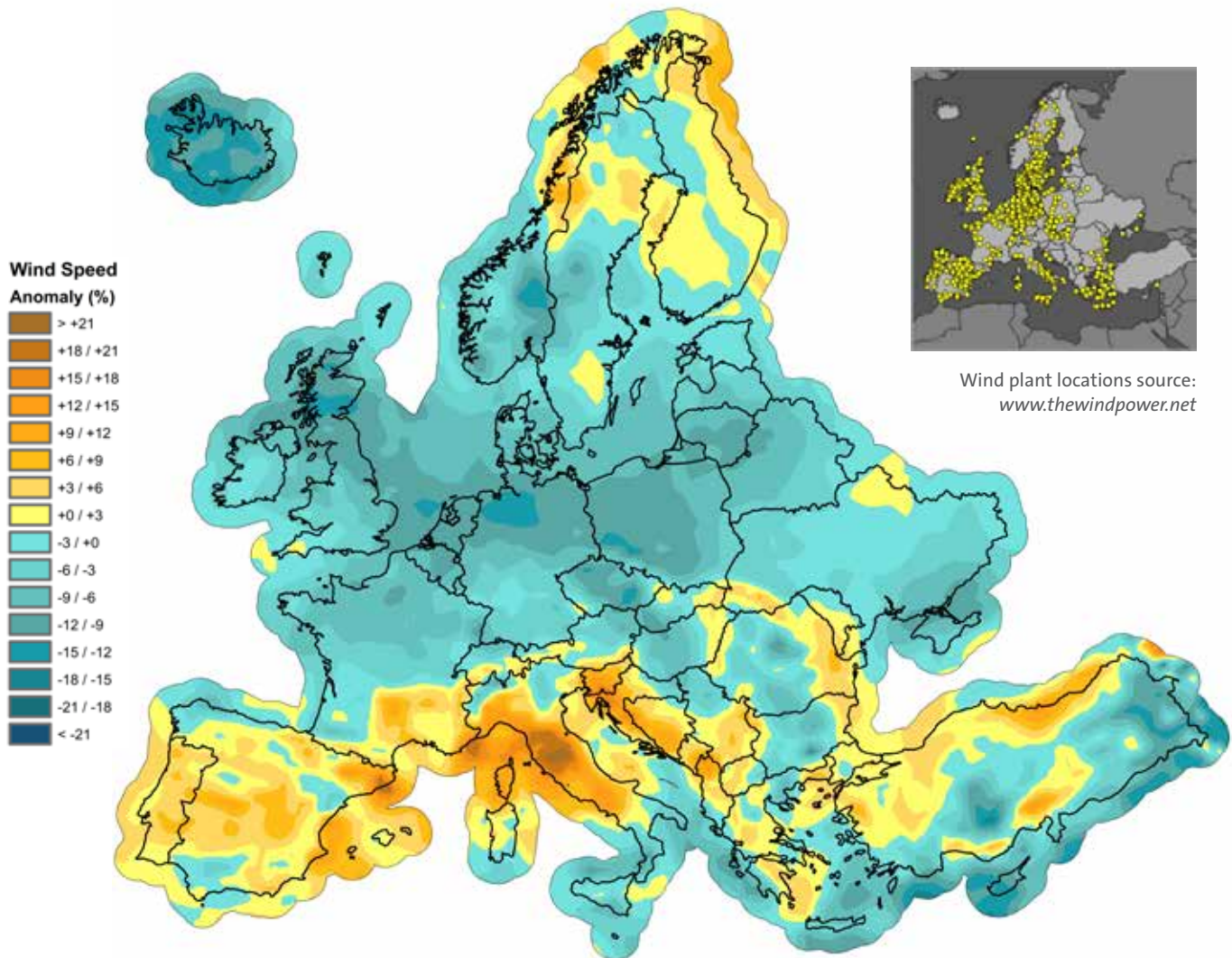
- Southern Peru
- Costa Rica
- Uruguay
- Chile
- Southern Brazil

Areas with above-average winds:

- Eastern Brazil
- Argentina
- Paraguay
- Northern Peru

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WIND SPEED PERFORMANCE



EUROPE

Q1 2017

Areas with below-average winds

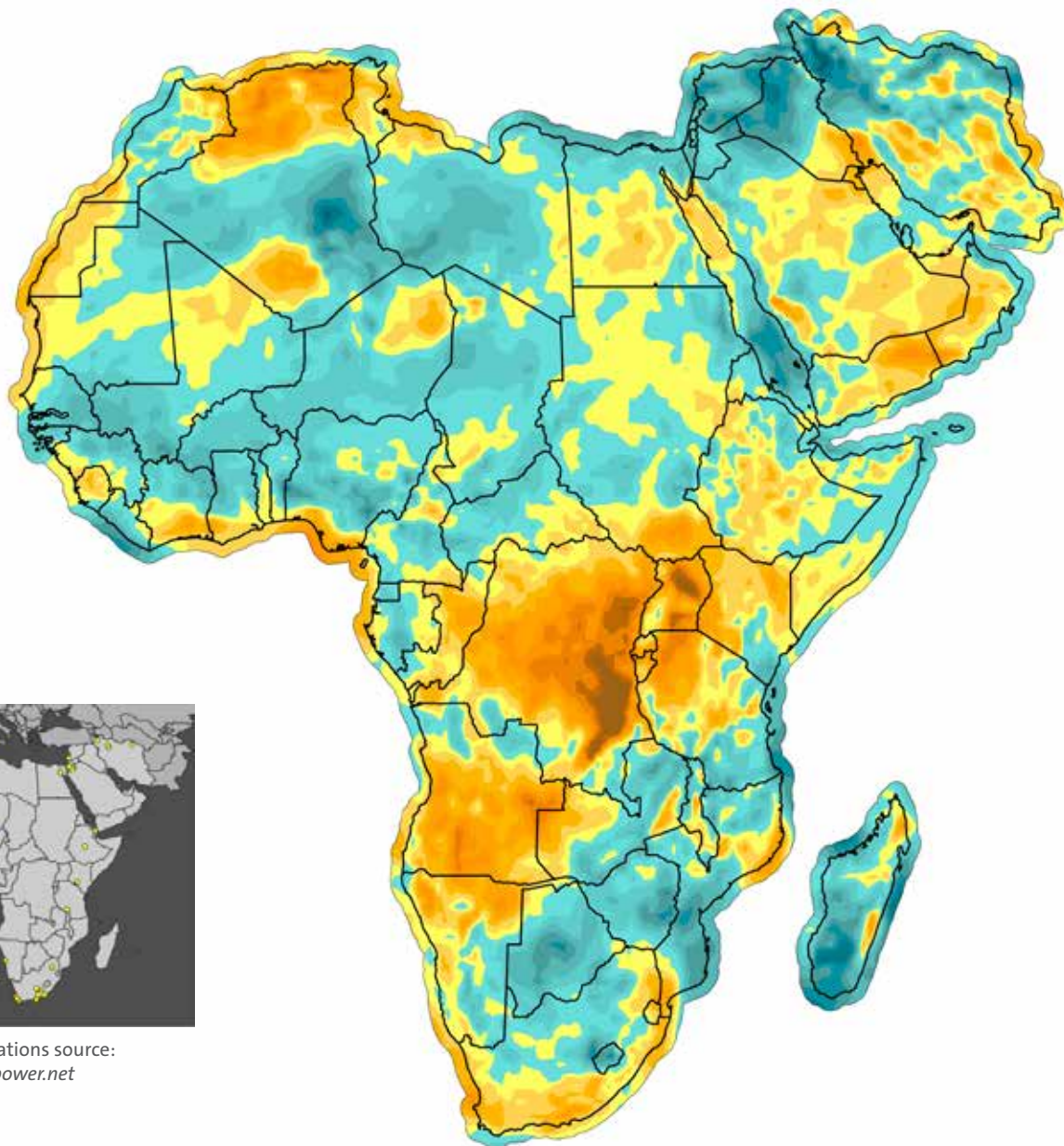
- United Kingdom
- Scandinavia
- Central Europe
- France
- Poland

Areas with above-average winds:

- Spain
- Portugal
- Italy
- Croatia
- Slovenia

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Wind plant locations source:
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AFRICA / MIDDLE EAST

Q1 2017

Areas with below-average winds

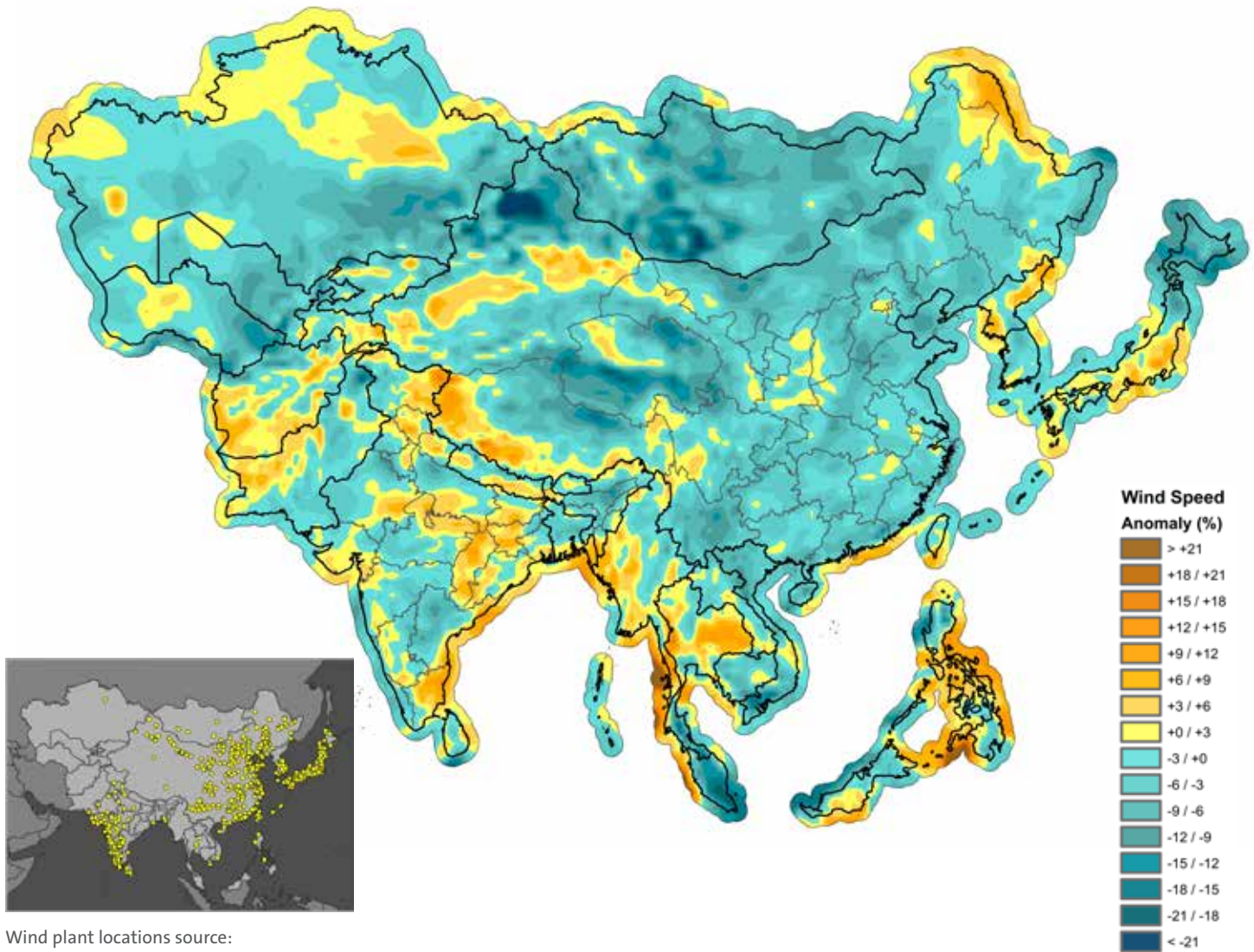
- The Levant
- Northern Iran
- Northern Tunisia

Areas with above-average winds:

- Coastal North Africa
- Coastal West Africa
- Coastal South Africa
- Southern Arabian Peninsula

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ASIA

Q1 2017

Areas with below-average winds

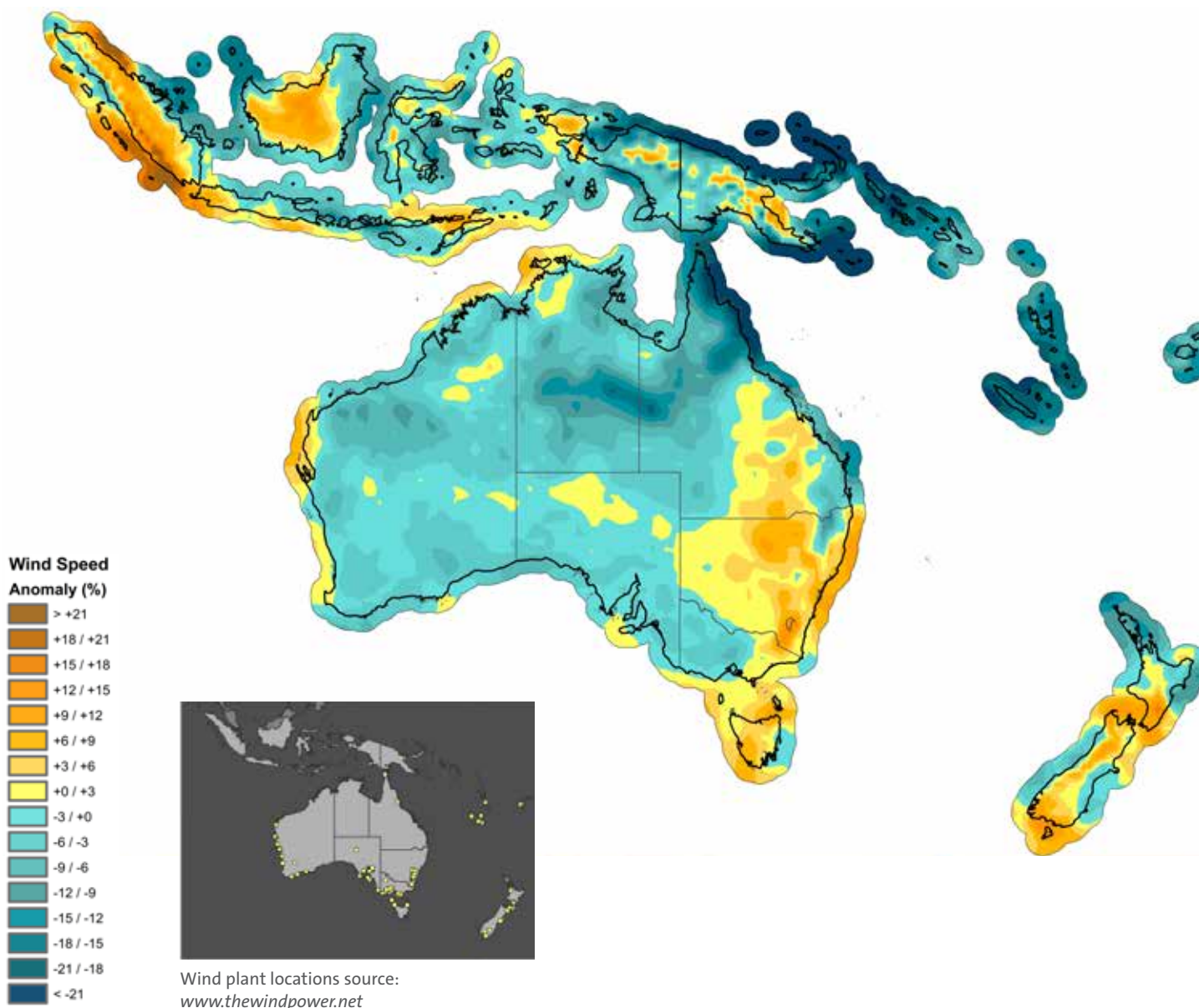
- Western India
- China
- Northern Japan
- South Korea

Areas with above-average winds:

- Southern Japan
- Thailand

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WIND SPEED PERFORMANCE



INDONESIA, AUSTRALIA AND OCEANIA

Q1 2017

Areas with below-average winds

- Australia
- New Caledonia
- Vanuatu

Areas with above-average winds:

- Tasmania
- New Zealand

Wind Trends Bulletin

2017 Wind Index

This index represents the average wind anomaly (expressed as a percent deviation in mean speed from the 1988-2014 baseline for the corresponding calendar period) for each region and country shown, weighted by the location and megawatt capacity of wind projects in production by the end of 2016. The wind project locations and rated capacities are from The Wind Power database (TheWindPower.net). Note that not all operating projects are in the database, and coverage in certain countries such as China is weak. However, AWS Truepower believes the findings are reasonably representative of wind conditions for the industry as a whole and for the key wind-producing countries.

Regions/Leading Wind Producing Countries	Jan	Feb	Mar	Q1	Apr	May	Jun	Q2	Jul	Aug	Sep	Q3	Oct	Nov	Dec	Q4	ANNUAL
North America	-2.4	3.3	6.4	2.2													
Canada	-3.9	1.4	11.3	2.6													
USA	-2.3	4.1	5.9	2.3													
Mexico	2.1	-4.1	2.6	-0.4													
South America	6.2	0.1	4.2	3.7													
Brazil	8.5	1.2	4.8	5.1													
Argentina	8.6	-0.3	1.2	3.6													
Europe	-11.3	2.2	-3.2	-4.6													
Denmark	-15.1	3.7	-5.9	-6.3													
France	-15.1	2.0	1.1	-4.8													
Germany	-21	1.7	-6.3	-9.4													
Great Britain	-17.3	0.3	-9.6	-9.3													
Ireland	-16.0	8.6	-0.9	-3.6													
Italy	12.2	-7.6	1.1	2.1													
Portugal	-5.1	19.3	-0.7	3.9													
Spain	-5.3	11.4	-1.0	1.2													
Africa / Middle East	4.2	2.2	2.5	2.8													
South Africa	8.0	3.8	4.2	5.4													
Asia	0.6	0.9	-9.4	-3.1													
China	0.8	-0.3	-10.9	-4.1													
India	-4.4	5.5	-5.9	-1.9													
Ind, Aus, Oceania	20.4	-3.1	-10.5	3.1													
Australia	-4.6	0.9	2.8	-0.6													
World	-5.6	2.1	-1.4	-2.1													

Click [HERE](#) to download index values for even more wind producing countries!