Height of wind turbine tower

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The 2019 Increasing Wind Turbine Tower Heights: Opportunities and Challenges presents the opportunities, challenges, and potential associated with increasing wind turbine tower heights, focusing on land-based wind energy technology.

Key findings of the report include:

There are obvious benefits to higher wind turbine towers, a new NREL report finds. But very tall towers remain rare in the U.S. market.

Contributing Writer Greentech Media

Each year wind turbines get taller in pursuit of steadier, stronger breezes.From 2000 to 2018, the average hub height of utility-scale wind turbines installed in the U.S. jumped from 58 meters to 88 meters, according to the American Wind Energy Association (AWEA).

A new National Renewable Energy Laboratory (NREL) report on tower heights for land-based turbines in the U.S. presents data that ratifies the industry’s quest for taller towers. But it notes that manufacturers must find ways to reduce the cost of erecting ultra-tall towers with hub heights of 140 meters or higher.

The report affirms the benefits of building taller turbines. Across large portions of the country, average annual wind speeds increase by 0.5 to 1.0 meters per second with a jump from 80- to 110-meter towers, and by 1.0 to 1.5 meters per second when moving from 80- to 160-meter towers, the researchers found.

Higher hub heights boost capacity factors, too. When modeled turbine tower heights were increased, researchers found the following increases in median capacity factors: 2 to 4 percentage points when tower heights grew from 80 to 110 meters; an additional 2 to 4 percentage points when towers go from 110 to 140 meters; and one more percentage point when they increase from 140 to 160 meters.

The researchers found that 110- and 140-meter towers are more effective in regions with more marginal wind resources and that the highest capacity turbine studied, 4.5 megawatts, performed better at 140-meter hub heights than did a 3 MW turbine.

That means that in many cases it makes sense for turbines to scale up in parallel with taller tower deployments.

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