

How the World's Biggest Plane Would Supersize Wind Energy

Radia, a unicorn startup, plans to use rocket science to overcome one of the wind power industry's biggest hurdles with a giant cargo plane.

By Jennifer Hiller and Brian McGill

An aerospace engineer thinks he knows how to transform renewable energy: by building the world's largest plane.

Mark Lundstrom, an MIT-trained rocket scientist and Rhodes scholar, has spent more than seven years with an engineering team designing the WindRunner, a gargantuan cargo plane. If completed, it will be the largest plane by length and cargo volume.

The plane's purpose is to carry wind turbine blades the length of football fields. The blades, among the world's longest, are currently used only for offshore projects because of transportation limitations onshore. Opening vast swaths of land to the largest turbines could transform wind energy, which has [seen a slowdown](#) in new U.S. onshore projects and price turmoil for [offshore projects](#).

The result would be land-based wind power installations with a blade tip reaching about 300 feet higher than the current average, roughly as tall as the U.S. Capitol with the Washington Monument stacked on top. Such projects would produce about double the energy current onshore installations do and be possible in more places, too.

Lundstrom's startup, Boulder, Colo.-based Radia, has kept the design private for years. Now, it says the WindRunner is more than halfway through the eight years it estimates it will take to design, build and certify the aircraft.

Lundstrom founded Radia in 2016 as he looked for ways to marry aerospace with the energy transition when he read that delivering unwieldy blades is among the trickiest logistics jobs in the energy business.

"That was a very clear moment when the industry speaks to you," Lundstrom said.

Today's offshore-sized wind blades can't be used easily on land because they can't move by rail or truck. They are too big to turn most corners and too wide to make it under bridges and traffic lights. Transporting them offshore requires specialized vessels.

Radia has raised \$104 million and is valued at \$1 billion, according to PitchBook. Employees and advisers include current and former executives at [Boeing](#), the Federal

Aviation Administration, utilities and renewable energy developers. Backers include oil giant [ConocoPhillips](#) and venture firms Caruso Ventures, Capital Factory and Good Growth Capital.

Former Energy Secretary Ernest Moniz, a member of Radia's advisory board, said utilities are increasing their demand forecasts by huge factors. Electricity usage is surging because of the electrification of transportation and heating across much of the U.S., plus booms in manufacturing and in data centers for artificial intelligence.

"They also want clean electricity," Moniz said.

Lundstrom plans to deliver blades for wind project developers and, in some instances, develop early stage projects on its own, though it doesn't plan to own or operate the sites.

The WindRunner includes shoulder-height tires and has the ability to land on a packed-dirt 6,000-foot runway, which would need to be built for each project. Lundstrom says projects would include about 25 of the supersize onshore turbines he envisions to be profitable.

Radia's first customer is a large independent power producer that has bought a 1-gigawatt project in Nevada.

Bigger is better in wind. Larger blades can harvest more wind, while taller towers place blades where winds are more consistent. It adds up to more electricity over more hours of the day, even in areas with lower average wind speeds.

Radia estimates the larger turbines could reduce the cost of energy by up to 35% and increase the consistency of power generation by 20% compared with today's onshore turbines.

Wind provided around 10% of large-scale electricity generation in the U.S. in 2022. It is a major source of electricity generation in the middle of the country, especially in Iowa, Illinois, Texas, Oklahoma and Kansas.

Larger blades attached to taller towers would make wind more competitive everywhere while making more of the U.S. viable for wind development, said Jesse Jenkins, a professor at Princeton University who did a study for Radia as a consultant. But the larger towers would be visible to more people, which could [stir community opposition](#). "The biggest question mark is the social license and social acceptability," Jenkins said.

Last year was the slowest for new wind installations in a decade as projects faced issues such as policy uncertainty and siting barriers, according to the American Clean Power Association. Manufacturers have faced reliability problems with their largest products, mostly stemming from quality-control issues.