

Wind + water = untapped energy: An abundance of power exists above Earth's oceans, study finds

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A study by UCI Earth scientists finds that wind energy over the planet's oceans is a vastly underutilized renewable resource.

(PhysOrg.com) -- Wind energy over the planet's oceans is a vastly underutilized renewable resource, according to UC Irvine researchers.

At 80 meters above the ocean - the typical wind turbine height - more than 50 percent more power is available than at 10 meters, the height important to the shipping industry upon which previous wind estimates were made.

Though Europe has led the development of offshore wind farms, conditions make U.S. coastal oceans prime for strong winds: The air is stable, and the water is cold, notes Charlie Zender, study co-author and Earth system science associate professor.

"In the midlatitudes, you find these stable environments where air really takes off and accelerates rapidly as you move away from the ocean's surface," he says. "There's a lot of power in the wind. The more we compare it to other energy sources, the more I'm impressed."

Ocean [wind power](#) has a lot of perks: It is clean and renewable and takes no land-based real estate - unlike other energy sources, such as coal-powered plants. Ocean turbines, typically placed in water up to 40 meters deep, can be closer to population centers than power plants, reducing leakage and cost of transmission lines. And networks of ocean wind farms are as reliable as coal plants at producing consistent levels of power, Zender says.

Offshore wind turbine towers, however, must be anchored to the [ocean floor](#) - restricting their distance from the coast - and they cost about 50 percent more than land models, partly because upkeep is more difficult. "There are issues with every energy resource," Zender says, "but wind has relatively few compared to coal, ethanol or nuclear power."

The study by Zender and graduate student Scott Capps is the first to calculate potential wind energy over the ocean at realistic turbine heights. Researchers started with the previous 10-meter wind estimates and made adjustments for humidity levels and air and ocean temperatures, which influence wind speed.

With global calculations made twice a day between 2000 and 2006, they estimated the average global ocean wind power at 841 watts for every square meter swept by turbine rotors. A single [ocean](#) turbine produces

about 1 million watts of power, enough to continuously supply about 1,000 houses.

Says Zender: "When you put our research together with existing studies over land, you get - for the first time - a global estimate of wind power reserves."

The National Science Foundation and NASA supported the study, published recently in the journal *Geophysical Research Letters*.

Provided by University of California, Irvine

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