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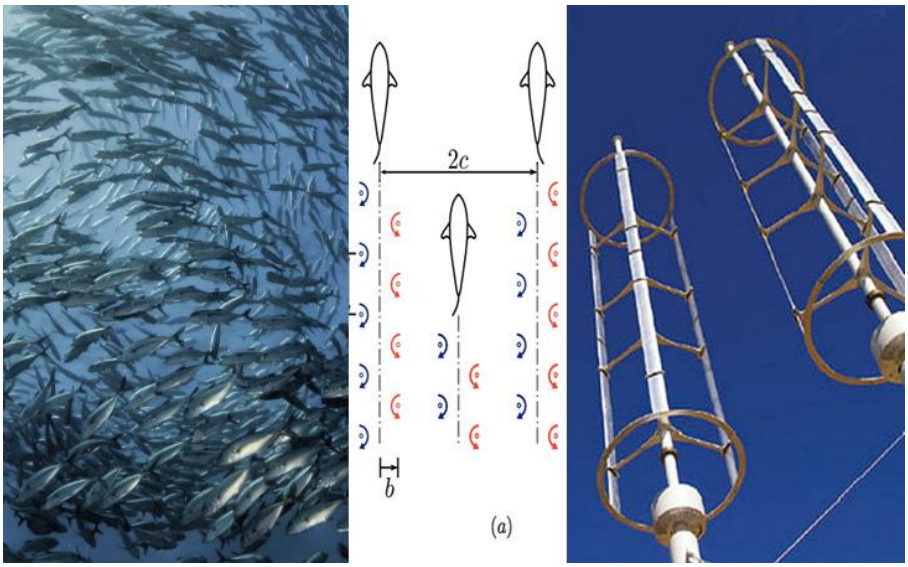
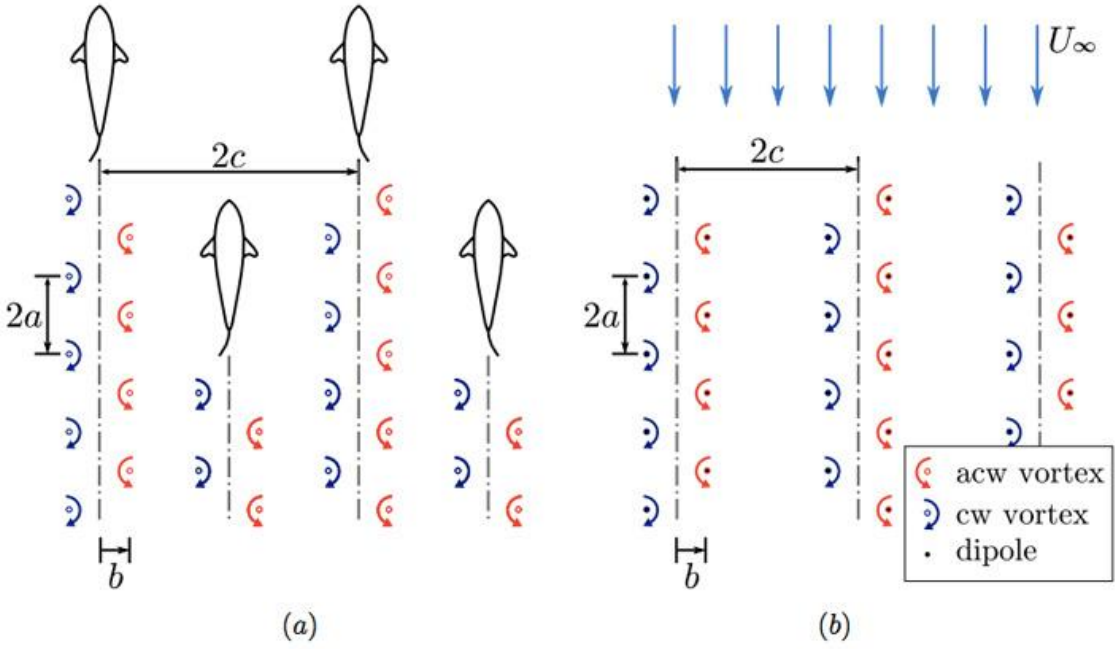
CalTech Researcher John Dabiri Uses Biomimicry to Design Cheaper, More Efficient Vertical Axis Wind Farms Inspired by Schools of Fish

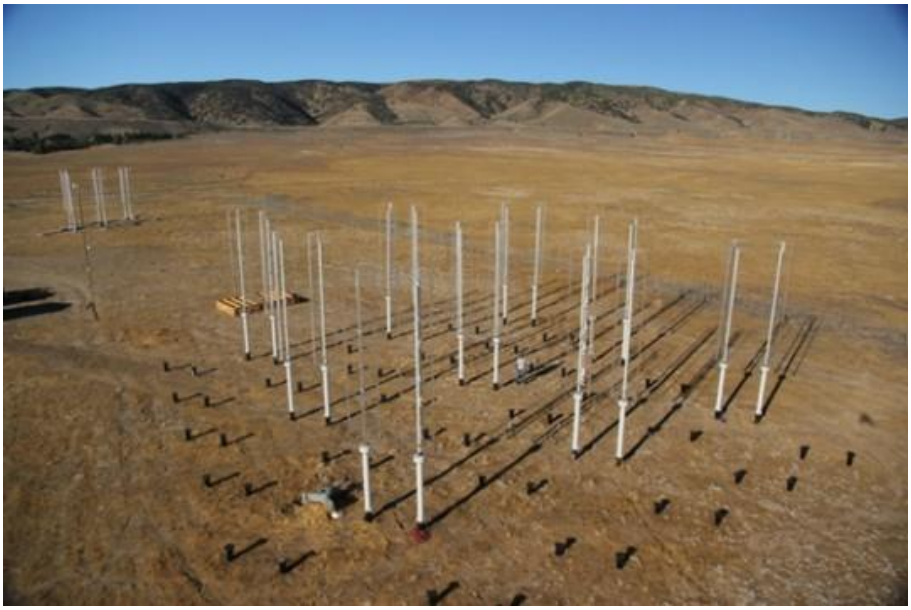
07/18/2013 by Mark Boyer



Wind turbine designs have improved significantly in recent years, but wind farms are still pretty inefficient. That's because traditional wind turbines — the ones with three huge blades — interfere with each other. Putting two or more large turbines in close proximity produces wind blocks and vortices that decrease the efficiency of the overall wind farm. But CalTech biophysicist and **MacArthur Foundation "genius grant" winner John Dabiri** discovered a solution to that problem by **studying the movement of schools fish**. He found that vertical-axis wind turbines with blades that resemble fins can work together to more efficiently harness wind energy.



There is a reason that **wind energy** developers use those large, three-blade wind turbines: When standing alone, a single traditional windmill is much more efficient than other types of wind turbines. But when grouped together, multiple wind turbines can interrupt airflow and affect the overall efficiency of a wind farm.That's the problem that Dabiri is addressing. For wind farms, Dabiri says that vertical-axis wind turbines are more efficient. And they're also much smaller and cheaper to produce than traditional windmills.



Dabiri's smaller vertical-axis turbines can be clustered very close together — like a school of fish — and each turbine's power coefficient doesn't drop much when placed in close proximity. In fact, the vertical-axis wind turbines can feed off of one another, resulting in increased efficiency in some cases.

"Schools of fish swimming in the ocean have to contend with vortices and disturbances caused by the other fish," **Dabiri told Sierra Magazine**. "Some species use less energy to move from point A to point B in groups than when they're by themselves, because they are able to use these vortices to enhance their swimming performance."

The wind turbines that Dabiri proposes are only about 30 feet tall, and the organization that he prescribes could pack hundreds of turbines into the area used by a single full-size turbine in a traditional wind farm. Dabiri and his CalTech team hope to produce a 3.5-kilowatt vertical-axis wind turbine that will costs just $3,500 and that could be easily assembled using basic tools. Ultimately, the new vertical-axis turbines could be combined with traditional turbines in large hybrid wind farms that would waste less space and produce much more energy.