

WAR OF THE TIDES

As energy prices soar, a motley crew of green-power entrepreneurs is racing to harness the oceans. Billionaire **Paul Tudor Jones** has waded into the fray, bankrolling underwater turbines in New York's East River.

By Anthony Effinger



Making waves: Dublin-based OpenHydro has installed tidal turbines off the coast of Scotland.

◀ When the tide rushes into New York Harbor, a strange thing happens at the Gristedes supermarket on Roosevelt Island. The freezers, cash registers—even the red neon “Bagels” sign—hum with electricity from the rip coursing up the East River. • The power comes from six underwater turbines bolted to the river bottom by a little-known startup called Verdant Power LLC. The 7-foot-long blades turn, silent and out of sight, until the flux crests. When the tide turns, the contraptions pivot 180 degrees and make juice on the ebb. • Tiny Verdant has a rich and famous partner, billionaire hedge fund manager Paul Tudor Jones. His Tudor Investment Corp. has staked \$15 million on New York-based Verdant, a company with 20 employees, zero profit and one very aggressive competitor lurking just upstream.



Paul Tudor Jones is betting on tidal power.



How It Works:

Unlike rivers, tides run in two directions. Rotors on Verdant's six tidal turbines are mounted behind generators. The units pivot when the tide turns, aiming their noses into the current. The turbines make power 77 percent of the time, stopping at high and low tide.

From New York Harbor to San Francisco Bay, a new breed of green-energy entrepreneurs is warring over the tides, the next big thing in alternative power.

As oil and natural gas prices climb, upstarts such as Verdant and rival Oceana Energy Co. are vying for investors' money and staking claims to America's coastal waterways. Since 2005, the U.S. Federal Energy Regulatory Commission, which regulates the energy industry, has granted Oceana, Verdant and six other companies the exclusive right to study the tides in 21 locations, from the East River in New York to the Icy Passage in Alaska. If the companies can figure out how to make projects pay

there, they'll get first dibs on federal licenses. The price of one of these potential golden tickets: \$0.

The froth is flying. Washington-based Oceana has angered Verdant Power executives by seeking a site just north of Verdant's East River turbine farm. Oceana, chaired by William Nitze, son of the late NATO architect Paul Nitze, has also irked the city of San Francisco by laying claim to the currents that swirl beneath the Golden Gate Bridge. The company has applied for a total of 13 study permits and is trying to use its pull in Washington to steer taxpayer money its way. "They're claim jumpers," Verdant Power co-founder William "Trey" Taylor says of his competitor.

Why the East River:

Turbines need fast currents, which occur where tides push through narrow channels. When the tide rises in New York, water rushes north up the East River, between Manhattan and Queens, accelerating to 500 feet per minute. Tides in Canada's Bay of Fundy, the world's largest, rip along at 800 feet per minute in some places.

Tide Power Gushers?

East River, New York

Golden Gate, California

Puget Sound, Washington

Columbia River, Oregon

Wrangell Narrows, Alaska

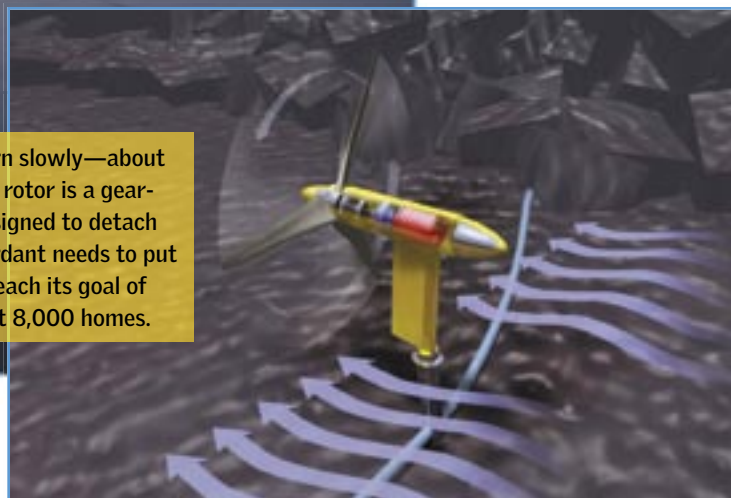
Icy Passage, Alaska

Piscataqua River, Maine

Bay of Fundy, Canada

Inside a Turbine:

The blades on Verdant's tidal turbines turn slowly—about 32 times a minute. Housed in front of the rotor is a gear-box and a generator. The turbines are designed to detach easily from the bedrock for servicing. Verdant needs to put about 300 turbines in the East River to reach its goal of generating 10 megawatts, enough to light 8,000 homes.



Oceana co-founder John Topping says his company has played by the rules. He says the best tidal sites were there for the taking.

"Somebody is going to do it, and we want to be the somebody," says Topping, president of the Washington-based Climate Institute, which promotes awareness of global warming.

The idea that the oceans might yield an endless supply of pollution-free power has lured an odd cast of characters. Tudor Jones joins a crush of engineers, lawyers and former politicians

racing to master the tides. One of Oceana's consultants helped design a bunker-busting nuclear bomb for the U.S. military. An engineer at Dublin-based tide power company OpenHydro Group Ltd. used to advise Ferrari SpA. Another tide entrepreneur built a fast boat for Colombian drug smugglers, which landed him in prison.

Tide power proponents are trying

to catch the wave of money that's washed over energy startups as the price of oil has tripled during the past five years. Costly OPEC crude and concern about global warming have ushered in a rich era for green power. Venture capitalists have invested millions of dollars in solar-energy and geothermal startups. Money managers such as Tudor Jones are clamoring

Oceana Energy has snapped up rights to tide power sites. 'Somebody is going to do it, and we want to be that somebody,' says co-founder John Topping.



Verdant co-founder **William Taylor** wants to put 300 turbines in New York's East River to power 8,000 homes in the city.

after companies that cook up gasoline substitutes from corn, sugar and soybeans. Alternative energy stocks have surged the way dot-com shares did in 1999. The 43-stock WilderHill Clean Energy Index has rocketed since its August 2004 debut, rising 62 percent as of April 11.

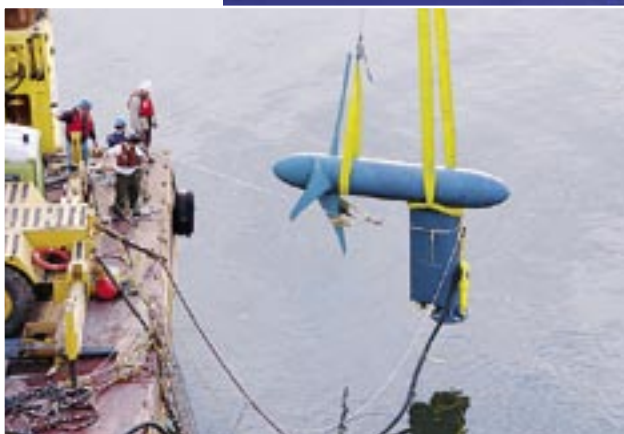
Tudor Jones, 52, has five people evaluating alternative-energy investments at his firm. A fishing enthusiast, he's chairman of the National Fish and Wildlife Foundation. He declined to be interviewed for this story.

Dan Schiff, an analyst who works in Boston at Greenwich, Connecticut-based Tudor Investment, says his boss is eager to invest in green companies, provided they pay off for the firm's investors. Tudor Jones's

flagship Tudor BVI Global Fund Ltd. has posted an average annual return of 24 percent since its inception in 1986. "We're always interested in deploying capital in a green fashion with a good return," Schiff, 30, says.

Tudor Investment is hardly betting the farm on tide power. The firm manages \$16.1 billion and has committed a mere \$15 million to Verdant. Tudor Investment has also invested in Bermuda-based Infinity Bio-Energy Ltd., which makes ethanol from sugar in Brazil. "We've been looking at a lot more of these," says Schiff, who sits on Verdant Power's board.

The clash between Verdant and Oceana started in March 2006, when



On New York's Roosevelt Island, this supermarket gets electricity from six Verdant turbines such as the one on the left.

says. "It looks like someone is trying to corner the market." That's not the case, he says. Oceana needs to study lots of sites because many won't make the grade, says Hoover, 29. He got interested in tidal energy while at New Orleans-based Tulane University Law School, from which he graduated in 2002.

So far, the reach of tide power enthusiasts far exceed their grasp. Taylor foresees a time when hundreds of Verdant turbines in the East River will power 8,000 homes in New York. He imagines dropping his machines into rivers and bays the world over to light houses and offices, desalinate water—even pull hydrogen from water to provide fuel for green-power cars. Because water is 850 times denser than air, a tide mill can generate more energy than a much larger windmill. Unlike breezes, tides are predictable.

That's Verdant's vision. Right now, its generators power a grocery store and charge a few hybrid buses on Roosevelt Island, which lies between Manhattan Island and the borough of Queens. The company is still testing its turbines and doesn't collect a dime.

Tudor's cash is key. "It gets us

an Oceana unit applied to FERC for a permit to study a swath of the East River north of Roosevelt Island. The stretch is called Hell Gate, for the currents that once wrecked sailing ships against hidden rocks. The frigate HMS *Hussar* sank there in 1780, with a trove of gold coins. The treasure has never been found.

In a filing with FERC in July, Verdant lawyer Gilbert Sperling compared Oceana with "dot-com exploiters who seized domain names and held them for ransom." Oceana plans to snap up sites and then sell the rights, Sperling wrote.

"I fully appreciate their position," Oceana General Counsel Mike Hoover

'We're always interested in deploying capital in a green fashion with a good return,' says Tudor Investment analyst Dan Schiff.



Oceana has irked San Francisco by laying claim to the powerful tides under the Golden Gate Bridge.

through the valley of death,” Taylor, 59, says. Verdant, founded in 2000, recently spent \$2 million on fish sensors to prove its turbines don’t turn local striped bass into sashimi.

Taylor is an unlikely energy entrepreneur. Early in his career, he helped market Pampers diapers in the Pacific Northwest for Procter & Gamble Co. Later, he was in charge of advertising for the Edison Electric Institute, a Washington-based utility trade group.

In the late 1990s, Taylor and two partners set out to commercialize a tidal turbine devised by Philippe Vauthier. Like many tide enterprisers, Vauthier, 71, has no formal training. He’s a jewelry maker. Tiffany & Co. once commissioned him to make a chalice for Pope John Paul II.

Taylor and his cohorts emptied their savings and 401(k) retirement accounts to build a prototype. The effort fundered \$500,000 later when Vauthier refused to divulge his plans to engineers Taylor had brought in, Taylor says.

Vauthier declines to comment on the split. “If you have nothing good to say, don’t say anything,” he says. Undaunted,

Tide power has lured an odd cast of characters. One turbine engineer previously designed a smuggling boat for a Colombian drug dealer.

Taylor and his team looked for another design. They came upon one cooked up years earlier by Dean Corren, then a research scientist at New York University.

The trick with tidal turbines is figuring out how to keep them from stalling as the speed of the current changes. Corren, who had been a Phi Beta Kappa member at Middlebury College in Vermont where he majored in philosophy with a minor in physics, had apparently found a good pitch and twist for the blades.

Corren got a U.S. patent for his design in 1986. He was about to put his turbine in the East River in 1986 when NYU shuttered its energy research program.

Corren moved back to Vermont, where he became a state representative. He stopped paying the fee required to maintain his patent. Taylor found a reference to it in a paper from the U.S. Department of Energy’s Idaho National Laboratory, which was originally constructed in 1949 to test nuclear reactors. Taylor pulled the expired patent and crafted a prototype. In 2002, he built a \$100,000 catamaran to drag the new rotor around underwater, simulating tides. On the first test, someone forgot a crucial cotter pin and the rotor sank to the bottom of Chesapeake Bay.

Subsequent tests went better. Taylor and his team moved on to real currents. They trucked the rig up to New York, moved into motor homes under the Roosevelt Island Bridge and ran more tests in the fast-moving East River, technically a tidal strait.

Taylor called Corren, who at the time was working as an aide to then Representative Bernard Sanders of Vermont. Sanders, an independent, became a U.S. senator in January. After Corren saw

his own design in action, he left Sanders and joined Verdant.

“This had been in the back of my head the whole time,” says Corren, 51, sitting in Verdant’s control room: an 8-foot by 20-foot metal trailer on Roosevelt Island that’s jammed with computers, power control boxes and a space heater buzzing against a March cold snap.

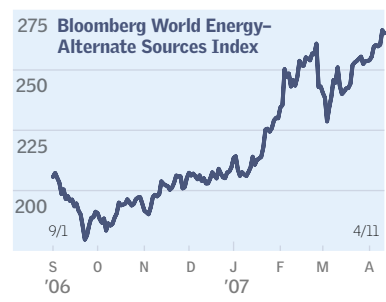
Verdant’s founders tapped out friends and family, then went looking for real money. Their pitch eventually caught the eye of Matt Klein, a hedge fund manager who’d made a fortune during the Internet boom and retired in 2000 at the age of 31.

Klein and his former hedge fund partner, Robert Tishman, staked the company. Then Tishman introduced Verdant’s management to Jim Pallotta, a portfolio manager at Tudor Investment. A few months later, Verdant got \$7.5 million from Tudor.

Oceana’s Washington offices are a world away from Verdant’s cramped control room on Roosevelt Island. Oceana operates out of a beaux-arts building off Dupont Circle in Washington that was once home to banker Andrew Mellon.

Green rally

High oil prices and global warming concerns have spurred alternative energy stocks.



Source: Bloomberg



Capital gang: Oceana's **William Nitze**, left, and **Dan Power** are working Washington contacts.

Nitze, whose father advised presidents from Franklin D. Roosevelt to Ronald Reagan, is the money man. A Harvard-educated lawyer, Nitze spent 14 years at Mobil Oil Corp. before working for the State Department under Reagan and the Environmental Protection Agency under President Bill Clinton. Last year, Nitze stumped up \$250,000 for a fifth of Oceana. "I became the angel investor," he says.

Nitze backed Oceana after a pitch from Joe Cannon, a lobbyist and former chairman of the Utah Republican party, and Hoover. Cannon's brother Christopher is one of Utah's three U.S. representatives.

The group has been working its Washington contacts. In September, Orrin Hatch, Utah's Republican Senator, wrote to FERC Secretary Magalie Salas, urging her to grant Oceana's permits. In the letter, posted on the FERC Web site, Hatch says he supports Oceana partly because the company plans to

manufacture its turbines in Utah.

Ned Hansen, Oceana's technology consultant, is also based in Utah. Hansen worked at Sandia National Laboratories in Albuquerque, New Mexico, on the bunker-buster bomb, a nuclear weapon designed to destroy enemy sites buried deep underground. Then he made a career change and became chief engineer for Logan, Utah-based S&S Worldwide Inc., maker of Screaming Squirrel roller coasters. Now, he owns an amusement ride consulting company called Ride Centerline LLC in Hyde Park, north of Logan.

Oceana is enlisting Utah's other senator, Robert Bennett, to earmark \$1.03 million in the 2008 federal budget for testing its turbine at the Carderock Division research center in Bethesda, Maryland, where the U.S. Navy tests ship models in pools 3,000 feet long.

As for actual hardware, Oceana so far has only a model, displayed in a clear

plastic case in its Washington office. The contraption looks like a wagon wheel, except there's no hub. The blades are mounted on the rim, half inside and half out. In a current, the blades will turn the movable rim, dragging magnets along a fixed ring anchored to the seafloor. That will make electricity, Oceana says.

The design looks similar to one being tested in the Orkney Islands by OpenHydro, the Irish company. The similarity is no accident.

In the 1990s, Herbert Williams, an Alaska crab boat captain, designed a tidal turbine that he planned to drop in the Atlantic Ocean off Florida to collect the energy of the Gulf Stream as it flowed toward Europe. Williams had put his engineering skill to other uses: He designed a fast smuggling boat for a Colombian cocaine dealer, according to an FBI agent's affidavit filed in U.S. District Court for the Southern District of Florida in 1987. Williams pleaded guilty to conspiracy to distribute cocaine and spent 4½ years in federal prison. He got out in 1993 and filed for a patent on his turbine two years later. He formed a company called Florida Hydro Inc. in Palatka, Florida, and set about raising money.

Topping, at Climate Institute, heard about Williams. He went to Palatka in 2003 and brought along an old friend, Dan Power, who's an engineer. "It was too complicated to put in the water," Power, 63, says of the design. He says he improved Williams's plan by substituting magnets for hydraulic pumps.

About this time, Hoover agreed to help Williams raise money in exchange for a chunk of equity in Florida Hydro, Hoover says. Florida Hydro was a wreck, he says. Shareholder records were in disarray. Environmental permits were incomplete. Williams didn't return phone calls for this story. "He's a genius, I'll give him that," Hoover says of Williams. "But he was never going to pass due diligence."

With Hoover's help, Florida Hydro

got three offers of \$10 million each, he says. In February 2005, Goldeneye Investments Ltd., a group of investors led by Irish hotelier Brendan Gilmore, came to Palatka and checked out the turbine. Goldeneye bought the technology from Florida Hydro with stock and promised to fund development of it.

Gilmore changed Goldeneye's name to OpenHydro. To run the new company, he hired James Ives, an engineer who once advised Ferrari on fluid mechanics. Canadian electric utility Nova Scotia Power Inc. has chosen OpenHydro over Verdant Power to put a turbine in Canada's Bay of Fundy, home to the world's biggest tides. "We have the world-beating technology here," says OpenHydro Chief Financial Officer Peter Corcoran.

Hoover, who became general counsel at Oceana in 2005, says Williams stiffed him. Williams promised Hoover 484,250 shares of Florida Hydro, which Hoover says are worth \$9.7 million, but paid him just 6,000 shares, Hoover says. In February, he sued Florida Hydro for breach of contract.

Tide power proponents are trying to catch the wave of money that's washed over alternative energy startups as oil prices have soared.

Oceana has detractors of its own. Tony Winnicker, a spokesman for the San Francisco Public Utilities Commission, says the company has made no progress studying the tides under the Golden Gate Bridge.

Robert Cinq-Mars, an electrical engineer based in Lee, New Hampshire, says the company has little expertise. "You've got some politically connected guys who haven't done much of anything asking for most of the moving water in seven states," says Cinq-Mars, a former fisherman who has taken an interest in tide power. "And they'll probably get it."

Tudor Jones, for his part, is betting on Verdant Power. Schiff says he and his colleagues scoured the industry and

concluded that Verdant has the best technology and management. Taylor says Verdant's East River tide farm marks more than just a good investment.

"This is our flight at Kitty Hawk," Taylor says, referring to the North Carolina town near where brothers Orville and Wilbur Wright flew the first successful airplane in 1903. The Wright brothers may have gotten aviation off the ground, but it took 55 years before America's first jetliner, the Boeing 707, crossed the Atlantic and changed the world. Tide power believers say their time will come.

Investors are rarely so patient. ▶

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BLOOMBERG TOOLS

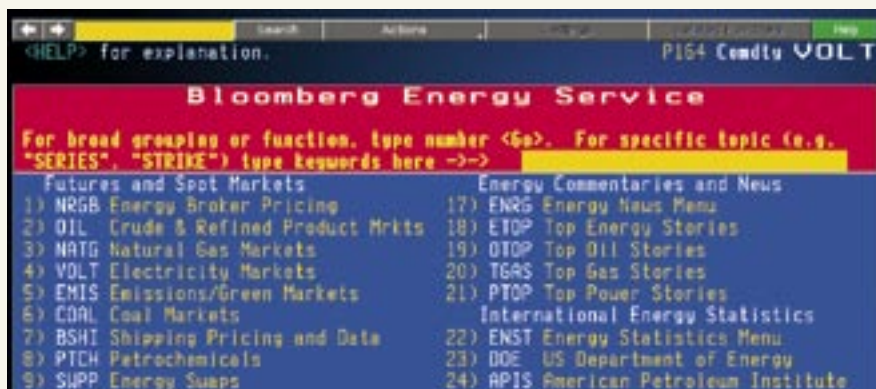
Tracking Clean Energy

The WilderHill Clean Energy Index, developed by Encinitas, California-based WilderShares LLC, tracks shares of alternative energy companies. Type ECO <Index> DES <Go> for a description of the 43-member index. This year through April 11, the index was up 11 percent. Type MRR <Go> to rank the index members by return. As of April 11, First Solar Inc., a Phoenix, Arizona-based maker of solar modules, was the best-performing member, with a gain of 109 percent for the year.

The index is tracked by an exchange-traded fund that's listed on the American Stock Exchange. Type PBW US <Equity> GP <Go> for a chart of the PowerShares Wilderhill Clean Energy Portfolio. Type VOLT <Go> to use the Electricity

Markets function to access the main menu of data on power prices and statistics, as shown below. Type 11 <Go> for a menu of data related to emissions markets and clean energy. Type NI HYDRO <Go> for news stories about hydroelectric power. For a menu of Web sites of green industry publications and organizations, type ENVW <Go>.

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For more information on Paul Tudor Jones, type BIO PAUL TUDOR JONES <Go> 1 <Go>.