

WIND

THE POWER. THE PROMISE. THE BUSINESS.

By Steve Hamm

Photography
by Bob Steffko

A partial answer to America's energy crisis is springing up. But the struggle to harness the winds of Kansas shows the difficulty in building an industry that threatens the status quo

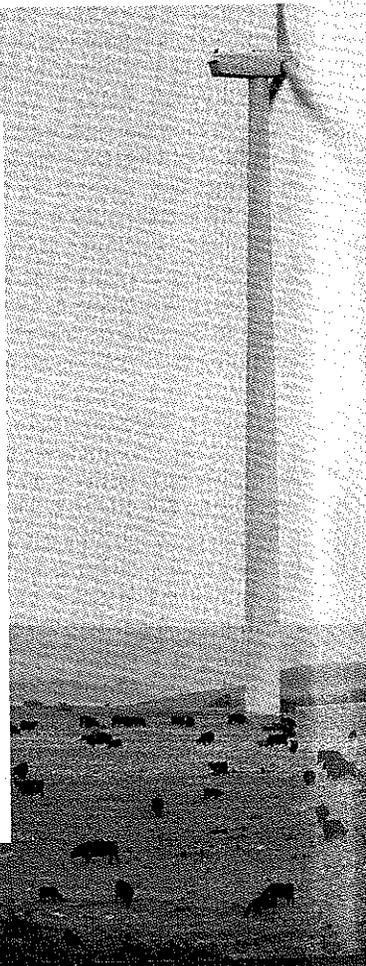
It's an ordinary day on Pete Ferrell's 7,000-acre ranch in the Flint Hills of southeastern Kansas. Meaning, it's really windy. When he drives his silver Toyota Tundra out of the canyon where the ranch buildings nestle, the truck rocks from the gusts. Up on top of a ridge, surrounded by a sweeping vista of low hills, rippling grass, and towering wind turbines that make you feel like a mouse scampering underfoot, Ferrell carefully navigates into a spot where the wind won't damage the doors when they're opened. Then he points to an old-style windmill, used for pumping water, which was erected by his father decades earlier when the ranch was in the throes of a drought. "That's the windmill that saved us in the '30s," he explains, his voice growing husky with emotion.

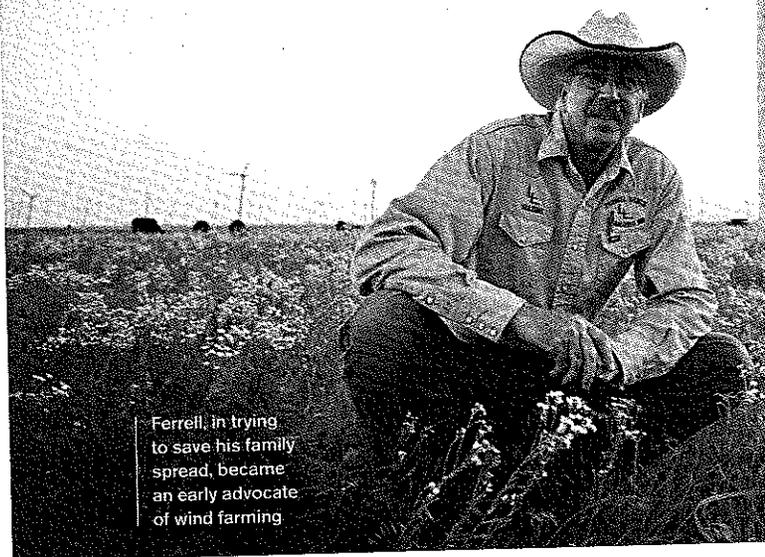
Ferrell, 55, is a fourth-generation Kansan who looks the part. He's slim with gray hair, squint-lines, and a cowboy hat. His great-grandfather established Ferrell Ranch on the high plains east of Wichita in 1888, and it has nearly failed several times over the years. Ferrell has held the place together through cattle grazing, oil wells, and, now, wind. He owns the land under 50 of the 100 turbines of the Elk River Wind Project, a 150-megawatt wind farm that opened in 2005.

Ferrell is one of the fathers of Kansas wind farming. He ran through three different developers before getting the operation going on his land. There was stiff opposition to wind farming in the Flint Hills from preservationists concerned about marring the landscape and from politicians tied to the coal industry, but, finally, Ferrell had his way. He now travels the state as an evangelist. "He has been a great spokesman for wind in Kansas," says Mark Lawlor, project manager in the state for Horizon Wind Energy, a wind farm developer. "He has lived off the land, and he's found something new he can tap into."

For centuries, the wind has been the enemy of the farmer. It blows away soil, dries out crops, and the howling makes some people crazy. So it's a twist of fate that wind is now emerging as

Windmills on the high plains have raised the ire of prairie preservationists





Ferreil, in trying to save his family spread, became an early advocate of wind farming

an ally. Some call the vast American prairie the Saudi Arabia of wind, capable of producing enough electricity to meet the entire country's needs—assuming there's the will to harness it.

Wind power, while still just a speck in America's total energy mix, is no longer some fantasy of the Birkenstock set. In the U.S., more than 25,000 turbines produce 17 gigawatts of electricity-generating capacity, enough to power 4.5 million homes. Total capacity rose 45% last year and is forecast to nearly triple by 2012. Right now, only 1% of the country's electricity comes from wind, but government and industry leaders want to see that share hit 20% by 2030, both to boost the supply of carbon-free energy and to create green-collar jobs.

Such a transformation won't come easily. While much of America's wind energy is in the Midwest, demand for electricity is on the coasts. And the electrical grid, designed decades ago, can't move large quantities of electricity thousands of miles. There's plenty of wind off the coasts, but it's both expensive to harness and controversial; not-in-my-backyard sentiment has slowed some of the most high-profile projects (page 50).

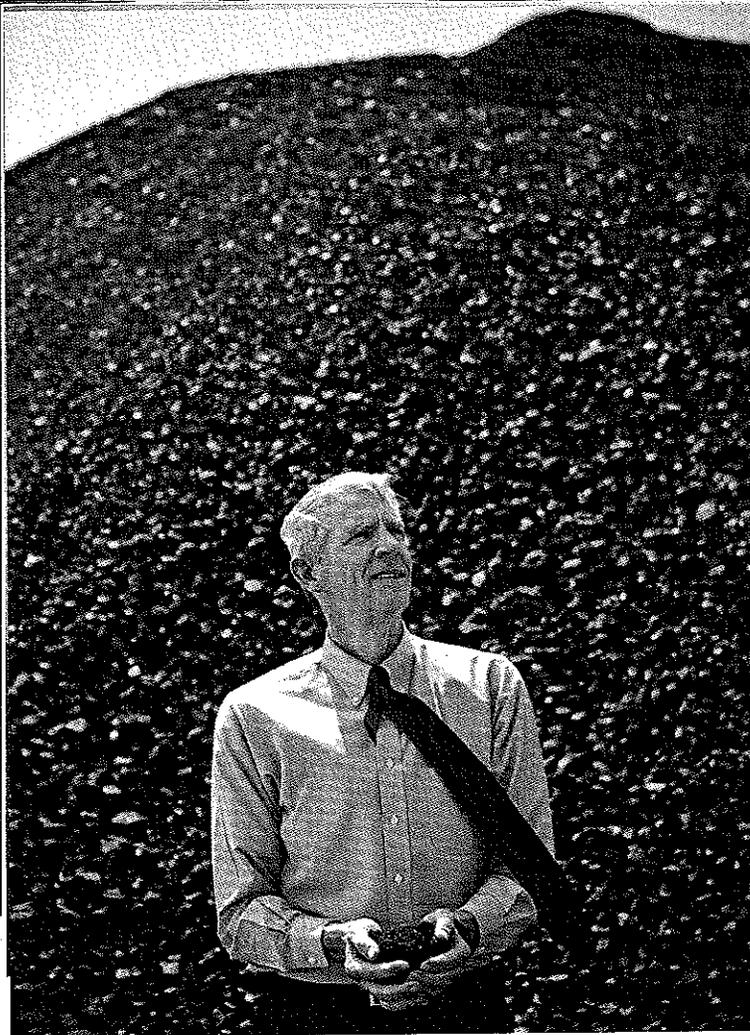
Kansas, in the middle of the wind belt, has become a battleground for the wind revolution. Advocates of alternative energy are pitted against defenders of the status quo, which in Kansas means coal. The flash point: a proposal by Sunflower Electric Power to build two 700-megawatt, coal-fired power plants in western Kansas. State regulators denied permits on

the basis of CO₂ emissions, the Republican-controlled legislature passed bills to overturn the ruling, Democratic Governor Kathleen Sebelius vetoed the bills, and the legislature has narrowly sustained her vetoes. So ferocious is this fight that Sunflower and its allies placed ads in newspapers suggesting that because Sebelius is against their coal project she's playing into the hands of Iranian President Mahmoud Ahmadinejad. The poisoned atmosphere helps explain why Kansas has only 364 megawatts of wind power capacity from about 300 turbines, despite having some of the hardest-blowing wind in the country, while Texas produces more than 10 times as much.

ELECTRICITY HIGHWAY

Making matters worse, Kansas has a poor electrical transmission grid. Most of the coal-fired plants are clustered around Kansas City in the east, yet most of the wind energy is on the thinly populated plains to the west. Now, emboldened by Sebelius' interest in wind energy, independent transmission outfits are lining up to build high-capacity lines from the windy west to consumers not only within the state but also beyond its borders. The U.S. Energy Dept., among others, would like to build the equivalent of an interstate highway system for transporting electricity around the country—if it could only find a budget for it. The part of the project targeting wind alone would cost about \$20 billion. Another hang-up: Major new transmission projects take up to four years to get approval from municipalities and state utility authorities. "The process just doesn't work," says Joseph L. Welch, chief execu-

DESPITE HAVING SOME OF THE HARDEST-BLOWING WIND IN THE COUNTRY, KANSAS PRODUCES ONLY A TENTH OF THE WIND POWER GENERATED BY TEXAS



Sunflower's Watkins has met stiff opposition trying to build two giant coal plants

steady supply—though that may change in a few years if there are enough wind farms in different places.

Coal, for the most part, is a cheaper alternative. It costs Sunflower about 1.5¢ per kilowatt-hour to produce electricity at coal plants, 10¢ to 14¢ in gas plants, and 4.5¢ for the electricity it buys from wind farms. But the economics of energy are changing fast. Coal prices have doubled in a year. And if you compare the costs of coal from new plants with wind energy from new wind farms, taking into account capital costs, they're roughly comparable, according to the National Renewable Energy Laboratory, which is funded by the Energy Dept.

"BATTLEGROUND" FOR THE NATION

Still, Sunflower hopes to forge ahead with its new coal plants, with a victory either in the legislature or the courts. Earl Watkins, its chief executive, complains that Kansas didn't have the right to deny permits because CO₂ emissions are not specifically cited in the regulations. "It's like being pulled over and ticketed by a policeman for running a stop sign—and there's no stop sign there," he says.

This point will be debated in legislatures and courtrooms across the land over the coming years. "We have become a battleground for the whole nation," says Lieutenant Governor Mark Parkinson, a Democrat, who has spearheaded Kansas' energy initiatives. CO₂, which has been linked to global warming, is not covered by most environmental rules. Yet other states are turning down coal plant permits for the same reasons Kansas did. In fact, wind power advocates argue that if the cost to the environment and the economy of CO₂ emissions were included when comparing the expense of running coal plants vs. wind farms, wind would be cheaper.

In Bazine, a town with a smattering of houses, Ferrell pulls up in front of the Golden Years Senior Center. It's a single-story metal building on the edge of a cornfield. Inside, he helps rough-handed farmers set up folding chairs, and soon most seats are filled. Ferrell gives a primer on wind. Landowners typically get about \$2,000 per turbine per year, but he advises them to stick together to gain negotiating strength on price. Also, they should own a piece of the project, not just collect lease royalties. He adds he'd be willing to develop their project or be a consultant.

Meetings like this are happening all over Kansas. More than a dozen projects are on the drawing board, and a slew of wind farm developers are aggressively mapping out the plains and ridgelines looking for the best locations for turbines. In some cases, they attempt to cut secret deals, giving different landowners different prices. That tends to anger the locals and is why the folks in Ness County decided to unite. "There's a wind rush going on out here," says Terry Antenen, who is one of the organizers. "Instead of being

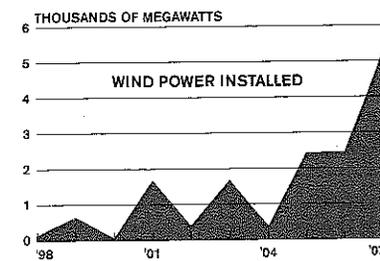
tive of ITC Holdings, a Michigan-based transmission company that hopes to build a major line through wind country.

The struggles to get wind projects going weigh on Ferrell's mind as he drives west on Route 96 through Wichita, Hutchinson, Great Bend, and the smaller towns of Albert, Timken, and Rush Center. Ferrell is on his way to tiny Bazine, a community in Ness County 208 miles from his home, to talk to landowners who have banded together to attract a wind farm developer. This is his new gig. He travels the state advising locals on how to get projects going, sometimes collecting consulting fees from landowners. He also is working with partners who have money to develop his own projects. "I learned my lessons in the Flint Hills. [Wind opponents] beat me up good. Now I know how to get things done," says Ferrell.

In Great Bend, Ferrell passes a gas-fired power plant operated by Sunflower. Running a utility company isn't simple. Since electricity can't be stored cheaply, you have to match supply and demand. Typically, that's done with a combination of low-cost coal and nuclear power, gas plants like this one that can be started quickly, and wind and other alternatives. Wind blows harder at some times than others, so you can't depend on a

WIND'S WILD RIDE

How interruptions in federal tax breaks for wind projects slow development



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On Ferrell's drive home from Bazine, the night sky is lit up with Kansas fireworks—huge lightning strikes. Thanks to the wind farm fees, he says, he has been paying off mortgages on his land. Now he has tied up with Tom Rinehart, a natural gas entrepreneur, to develop wind farms. In time, he hopes to hand off the Ferrell Ranch to his two children, now in college. And if things go really well, he says, he'll set up a foundation dedicated to community development within the Flint Hills.

HELP FROM WASHINGTON

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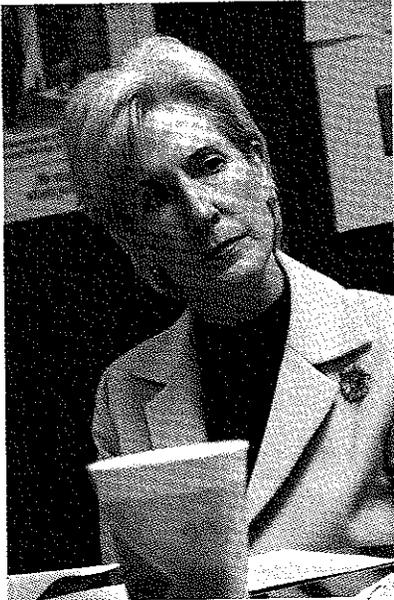
The era of the small-time wind developer may already be passing, anyway. Ferrell says it's tough to compete with big outfits with economies of scale and easier access to capital. It costs roughly \$225 million to build a 150-megawatt wind plant. Horizon, the big wind developer, has 11,000 megawatts of projects in the works and is hoping to add Ness County to the list. A few days after the meeting in Bazine, Ferrell calls Antenen to say he won't bid on the project. There's a shortage of good transmission lines in the area, and it

could take several years to upgrade them.

Kansas Governor Sibelius has emerged as an vocal proponent of wind energy

Even the big players need government help to get major wind projects off the ground. Twenty-five states require their utilities to use a percentage of renewable energy, and in all of them, alternative-energy projects rely on the federal government's production tax credit. That expires at the end of this year, so wind advocates are pressing Congress to renew it. In the past, every time it was allowed to expire, wind development plummeted the following year.

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CHUCK FRANCIS/AP PHOTO

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It's no longer if, but when, where, and how many wind farms will go up along the U.S. coast

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Wind farms are springing up in Midwestern fields, along Appalachian ridgelines, and even in Texas backyards. They're everywhere, it seems, except in the windy coastal waters that lap at some of America's largest, most power-hungry cities. That's partly because the first large-scale effort to harness sea breezes in the U.S. hit resistance from an army led by the rich and famous, waging a not-on-my-beach campaign. For almost eight years the critics have stalled the project, called Cape Wind, which aims to place 130 turbines in Nantucket Sound about five miles south of Cape Cod. Yet surprisingly, Cape Wind has largely defeated the big guns. In a few months it may get authorization to begin construction. Meanwhile, a string of other offshore wind projects is starting up on the Eastern Seaboard, in the Gulf of Mexico, and in the Great Lakes.

Much of the credit—or blame—for this activity goes to Jim Gordon, the man who launched Cape Wind in 2000. His goal is to provide up to 75% of the electric power on Cape Cod, Nantucket, and Martha's Vineyard by tapping the region's primary renewable resource: strong and steady offshore breezes. He has methodically responded to every objection from Cape Cod property owners and some-time-vacationers, ranging from heiress Bunny Mellon and billionaire Bill Koch to former Massachusetts Governor Mitt Romney and Senator Edward M. Kennedy (D-Mass.). "This is like trying to put a wind farm in Yellowstone National Park, as far as we're concerned," says Glenn Wattle, CEO of the Alliance to Protect Nantucket Sound, the opposition's lobbying arm.

Since 2000, Cape Wind's Gordon has burned through \$30 million of his own wealth, much of it to pay for studies of the site. The result is a four-foot-high stack of environmental reports, including three federal applications looking at the wind farm's potential impact on birds, sea mammals, local fishermen, tourism, and more. "We've gone through a more rigorous evaluation process than any prior energy project in New England," says Gordon, who built natural-gas-fired power plants before starting Cape Wind.

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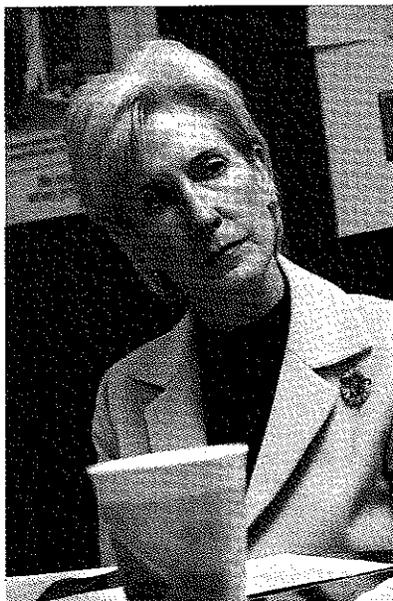
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MAP BY LAUREL DAVINIS-ALLEN/BW

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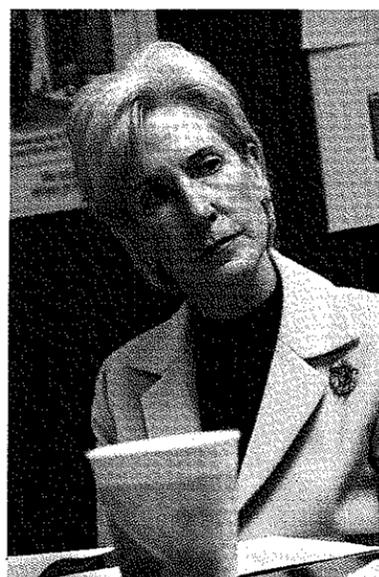
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SHORE WINDS

Dozens of offshore projects have sprouted along U.S. coastlines. Here are some of the most advanced proposals:

KEY: □ VERY GOOD, SUSTAINED WINDS
□ HIGHEST GRADE, MOST CONSTANT WINDS

Data: AWS Truewind, BusinessWeek

NEW YORK
The state's sole offshore project, off Long Island, is on ice but could be revived

RHODE ISLAND
Has bids near Block Island to supply 15% of the state's power

NEW JERSEY
Three groups have bid on sites from Atlantic City to Cape May

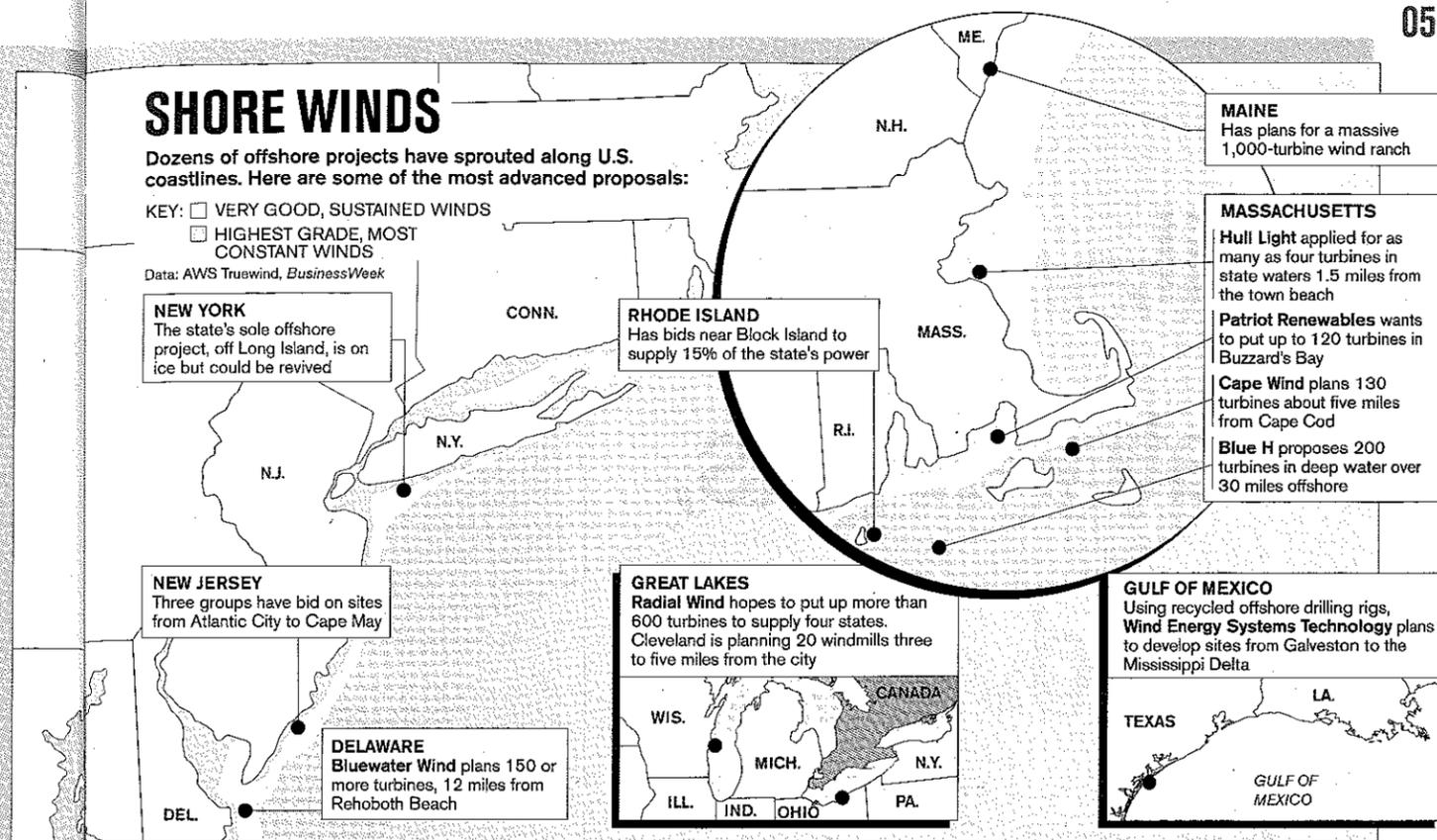
DELAWARE
Bluewater Wind plans 150 or more turbines, 12 miles from Rehoboth Beach

GREAT LAKES
Radial Wind hopes to put up more than 600 turbines to supply four states. Cleveland is planning 20 windmills three to five miles from the city

GULF OF MEXICO
Using recycled offshore drilling rigs, Wind Energy Systems Technology plans to develop sites from Galveston to the Mississippi Delta

MAINE
Has plans for a massive 1,000-turbine wind ranch

MASSACHUSETTS
Hull Light applied for as many as four turbines in state waters 1.5 miles from the town beach
Patriot Renewables wants to put up to 120 turbines in Buzzard's Bay
Cape Wind plans 130 turbines about five miles from Cape Cod
Blue H proposes 200 turbines in deep water over 30 miles offshore



MAP BY LAUREL DAINIS-ALLEN/IRV

Even if Washington O.K.'s the project, he must find a way to finance it. Expected costs have more than doubled in the last eight years, to over \$1.5 billion, by some estimates. And assuming the funding comes through, engineering and construction could drag on for three or more years.

Regardless of how this all plays out, Gordon has secured his spot as one of U.S. wind power's pioneers. When it comes to building natural gas and oil rigs in federal waters, energy companies must follow clear government rules. But until Cape Wind floated its first proposal, Washington had never spelled out how to develop an offshore wind farm. Gordon's plan prodded the Minerals Management Service, the federal agency that oversees energy extraction from public lands, to take action. The regulators hope to release detailed rules for utilizing wind, wave, and tidal power by yearend, at which point the path will be cleared for applications from a dozen or so wind projects in federal waters, with nearly as many under way in state areas. "We'll see an incredible flurry of proposals to tap ocean resources for clean and renewable energy," says Maureen A. Bornholdt, program manager at the MMS's Office of Alternative Energy Programs.

It's easy to understand why entrepreneurs are rushing in. Winds at sea blow stronger and more steadily than on land, where they are slowed by forests, hills, and tall buildings. Unlike terrestrial winds, sea breezes also tend to keep blowing during the hottest times of the day, when the most power is needed. Within a few miles of much of the U.S. coastline, in

almost any direction, wind resources are more abundant and dependable than anywhere outside the Great Plains. Exploiting this resource could supply about 5% of all U.S. electricity by 2030, says the National Renewable Energy Laboratory.

Putting turbines in open water is not a cheap proposition. It costs up to twice as much as in rural expanses. But the economics still work well in the Northeast, where open land is scarce, electricity is pricey, and demand for power keeps surging as populations swell. The Northeast is heavily dependent on electricity from natural gas, which has doubled in price in the past year. What's more, most state governments in this region have passed laws dictating that a growing share of power must come from renewable resources. These states "have to build offshore," says Bruce Bailey, president and CEO of AWS Truewind, which assesses wind resources. "They won't be able to meet their [renewables goals] if not."

In Hull, Mass., a faded Victorian-era beach town just across the bay from Boston, there's already a windmill spinning above the local high school and another over the dump. Four more turbines are planned for the waters just a mile and a half from one of Greater Boston's busiest public beaches. Thanks to the two functioning windmills, power rates in the town haven't risen in seven years, although they've doubled statewide. With four more, Hull could meet all of its needs with homegrown energy, says town manager Phil Lemnios.

Throughout New England, shrunken shipbuilding and fishing towns have begun to view offshore wind power as a

 Oil,
 natural gas,
 wind,
 solar,
 biofuels.



beyond petroleum®

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source of investment and jobs. In Rhode Island, a consortium of fishermen is vying with Bluewater Wind, a unit of wind-farm developers Babcock & Brown, to put turbines in state waters near Block Island. Across the region, planners hope to reanimate shipyards by building not just turbines and foundations but also the specialized ships needed to transport and erect supersized towers and blades. In Delaware, Bluewater Wind has a project in development that could produce as much as 600 megawatts 12 miles from Rehoboth Beach; it scored an industry first in late June, when it inked a long-term contract to supply electricity to Delmarva Power. Bluewater's project may well become the first functioning offshore wind farm in North America.

The shores of the Great Lakes, with their strong winds and shallow waters,

on gigantic steel tubes bored into the seabed. It's a proven approach, but it demands a lot of costly steel and can't go too deep. Moving farther offshore on rigs allows developers to tap stronger winds—and the turbines are out of sight.

Europe is some 15 years ahead of the U.S. in exploiting offshore wind. Hundreds of giant windmills already dot the North Sea, with more than 1,000 megawatts of generating capacity. This head start provides an edge to equipment suppliers such as Denmark's Vestas Wind Systems and Germany's Siemens, the only two companies building offshore turbines in large volumes today. By 2020, Europe hopes to generate a quarter of all its electricity offshore.

As wind farms are moved into deeper water, they can take advantage of the oil sector's offshore drilling knowhow, says John Westwood, CEO of Douglas-Westwood, a London-based market analyst that focuses on offshore energy. The U.S. has decades of expertise in this area, he adds. Schellstede's company, for example, is looking at a new design that adapts multilegged platforms from the oil business. These rigs could be stable enough to withstand a hurricane and would use less steel than the current generation of coastal wind farms.

Back in Cape Cod, the talk is all about deep water, too. In June, real estate agents, marina managers, and property owners met at a Chamber of Commerce breakfast to discuss the latest proposal. Blue H Technologies of the Netherlands has dreamed up a project roughly the size of Cape Wind but over 30 miles out to sea, in depths of 160 feet. Blue H is testing a design with novel two-bladed turbines that uses floating windmills chained to huge anchors. The company faces years of costly development. Still, the region's die-hard opponents of Cape Wind have embraced the plan as a better solution for Cape Cod. In a decade or so, those foes may find themselves enjoying ample supplies of green power from not one, but four or more offshore farms. **IBW**



Cape Wind's Gordon may soon get the O.K. to build turbines off Cape Cod.

are also luring developers. Cleveland is among a handful of cities planning wind farms. With offshore wind as a driver, the Rust Belt city wants to remake its waning industrial base into a launchpad for green energy projects.

Down in the Gulf of Mexico, a consortium of oil-and-gas-industry veterans has leased tracts stretching from Galveston, Tex., to the Mississippi Delta to develop offshore wind. Their startup, Wind Energy Systems Technology, plans to adapt retired oil rigs to cut the cost of building offshore plants to a fraction of current prices, says CEO Herman J. Schellstede. The rigs also let them site the turbines farther out at sea. Today's offshore windmills are built

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