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Taking to the wind

How a series of offshore wind farms are helping change how we view energy

This is an example of what an offshore windfarm looks like. To learn more about the Bureau of Ocean Energy Management and interagency process that helps develop these renewable energy windfarms in federal waters, visit www.BOEM.gov/Renewable-Energy. Credit: BOEM.

Taking to the wind

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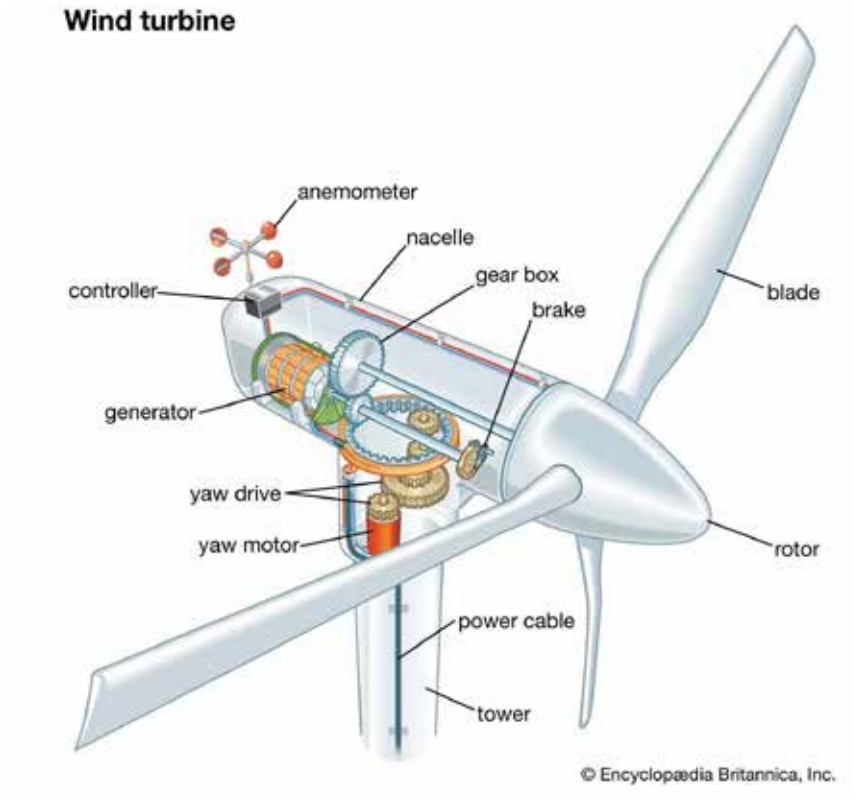
By JoAnne Castagna

Dec. 17, 1903: It was a windy day at Kitty Hawk, a coastal area of North Carolina, but suitable for the Wright brothers' first test of their motor-operated flyer. In fact, they specifically chose this location for its wind. They started the engines and the propellers turned. After a few attempts, they managed to get the flyer off the ground for 59 seconds for a distance of 852 feet. It was the first-time humans would fly, but it would not be the last.

Today, something else is harnessing the power of the wind at Kitty Hawk. Off the coast, a new offshore wind farm is being constructed through a collaboration of federal government agencies with the goal of making wind energy an everyday part of American life.



A look at the internal structure of a wind turbine showing three massive blades that harness the power of the wind by turning gears inside a housing. As these gears turn, a connected electrical generator transforms wind power into electricity. Source: Encyclopedia Britannica.

What's happening at Kitty Hawk is advancing the Biden Administration's offshore wind energy goals outlined in Executive Order 14008: Tackling the Climate Crisis at Home and Abroad, issued Jan. 27, 2021. The executive order directs interagency collaboration:

"…to increase renewable energy production on those lands and in those waters, with the goal of doubling offshore wind by 2030 while ensuring robust protection for our lands, waters, and biodiversity and creating good jobs."

To help meet this goal, the US Army Corps of Engineers (USACE) North Atlantic Division is collaborating with the Department of the Interior's Bureau of Ocean Energy Management (BOEM). USACE is providing BOEM and its wind energy developer contractors scientific and technical support, and regulatory oversight prior to its construction of offshore wind farms in the waters off the mid-Atlantic and the Northeast coasts.

"This partnership is a great example of federal agencies coming together for a common goal: to advance renewable energy solutions for the nation," says Karen Baker, former USACE North Atlantic Division regional programs director and current BOEM Chief of the Office of Renewable Energy Programs. "We look forward to applying USACE's scientific and technical support to enable the BOEM-led team."

What is Renewable Energy?

Renewable energy comes from natural sources or processes that are constantly replenished, such as sunlight or wind. Wind can be harnessed to create electricity. To do

this, wind turbines are used. Several turbines together create what is called a wind farm. While wind farms can be constructed either on- or offshore, wind energy resources tend to be stronger offshore.

Wind turbines are large structures whose towers can be as tall as a New York City skyscraper. Typically, three blades extend from these towers with widths reaching the length of a football field. Heavy foundations that can be 220 feet long and weigh 1,000 tons secure the turbines to the ocean floor. Wind turbines in deeper ocean waters can be constructed on floating platforms instead.

Electricity is generated as wind turns the turbine's blades. The blades turn a shaft inside the turbine. The shaft turns slowly and is connected to several gears that cause a smaller shaft to turn much faster. This smaller shaft drives the electrical generator.

This generated electricity then flows through a buried underwater cable to an onshore substation where the voltage is stepped up and it connects to the onshore electrical grid. Before offshore wind farms like this can be constructed, wind energy developers must go through the National Environmental Policy Act review and approval process led by BOEM with USACE's support as a cooperating agency.

NEPA requires federal agencies to assess the environmental effects of their proposed actions prior to making decisions on permits to allow the construction of these structures.

USACE New England District Project Manager Christine Jacek is heavily involved with offshore wind farm projects in the New England region. She says USACE reviews and comments on the wind energy developer's Environmental Impact Statement—a government document that outlines the impact of a proposed project on its surrounding environment.

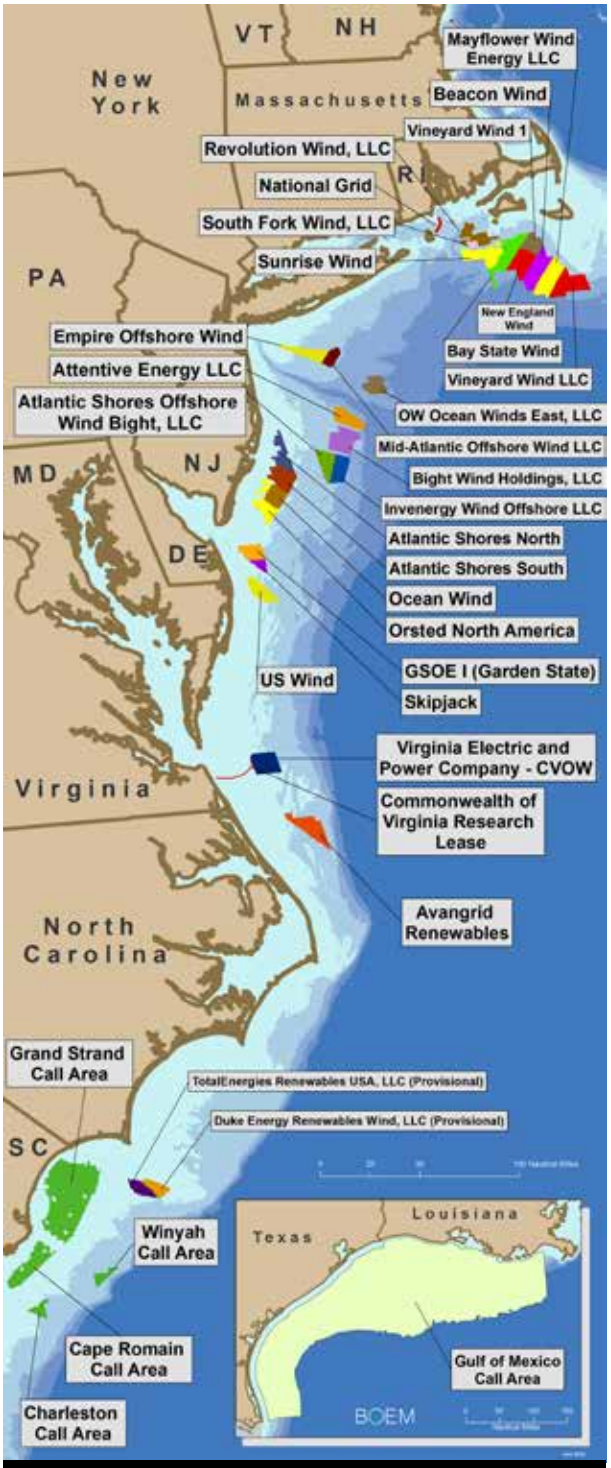
"It's reviewed in accordance with our regulations and ensures impacts to the aquatic environment are avoided or minimized," she says. "Based on this review, USACE is responsible for providing the developers permit decisions. These projects can't proceed without permit decisions issued by USACE."

USACE also makes sure wind energy developer's construction plans don't negatively impact USACE projects. Naomi Handell, USACE North Atlantic Division regulatory program manager, gave this example, "If an underwater transmission cable route would cross a federal channel or the wind developer proposes to cross over an area where USACE is dredging sand for a project, we advise BOEM and the wind energy developers on ways to avoid this."

Following are a few of the offshore wind farm projects planned or moving forward in the waters off the mid-Atlantic and the Northeast coastlines:

Kitty Hawk Offshore Wind Project, North Carolina

USACE Norfolk District is serving as a cooperating agency as part of BOEM's environmental impact study review. According to BOEM, the project will sit 27 miles off the coast of Kitty Hawk.



The Department of the Interior's Bureau of Ocean Energy Management's renewable energy activities in the mid-Atlantic and Northeast coasts. Credit: BOEM.

Throughout 122,405 acres of ocean, there will be up to 69 offshore wind turbines generating 5.2 gigawatts of energy to 700,000 homes by 2026. USACE's South Atlantic Division is also working on this project.

Coastal Virginia Offshore Wind Commercial Project, Virginia
Norfolk District is also serving as a cooperating agency as part of BOEM's environmental impact study review. This will be the biggest offshore wind farm in the United States and one of the biggest in the world, according to BOEM. The project will sit 27 miles off the coast of Virginia Beach. Throughout 176 miles of ocean, there will be up to 205 offshore wind turbines generating up to 8.8 million megawatts of power annually to 660,000 homes in 13 states by 2026.

US Wind, Maryland
USACE Baltimore District is serving as a cooperating agency as part of BOEM's environmental impact study review. The project is projected to sit 11.5 miles off the coast of Maryland. Throughout 79,707 acres of ocean, the project is slated to have 126 offshore wind turbines generating 2 gigawatts of power for multiple states.

Ocean Wind 1, New Jersey
USACE Philadelphia District is serving as a cooperating agency as part of BOEM's environmental impact study review. This project will sit 13-miles off the coast of Atlantic City, New Jersey. There will be up to 98 offshore wind turbines generating up to 1.1 gigawatts of power annually to 500,000 homes by 2024.

South Fork Wind, New York
USACE New York District issued a permit and authorized construction in January 2022, to move forward. The project will sit approximately 19 miles southeast of Block Island, Rhode Island, and 35 miles east of Montauk Point, Suffolk County, New York. Throughout approximately 13,700 acres of ocean, there will be up to 12 offshore wind turbines generating approximately 132 megawatts of power for approximately 70,000 homes in New York.

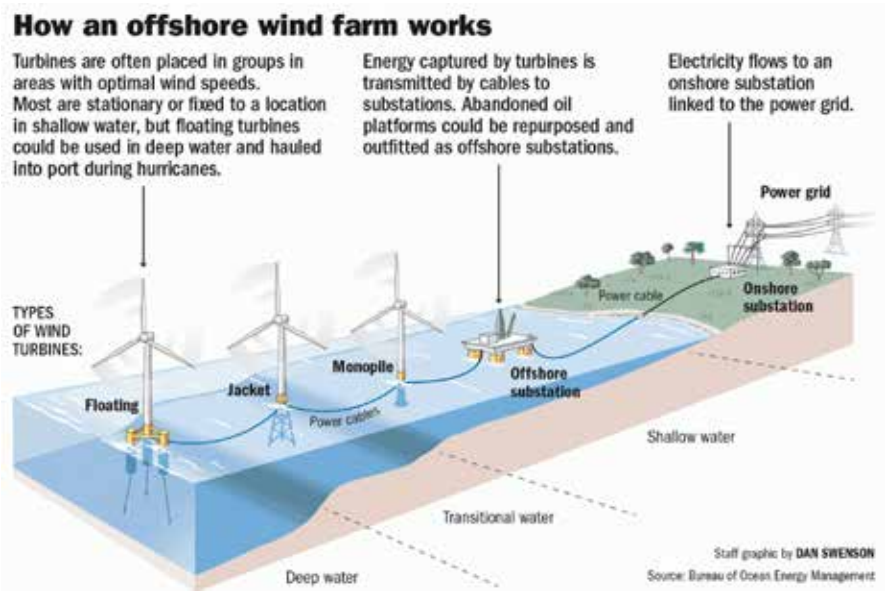
Revolution Wind, Rhode Island
USACE New England District is serving as a cooperating agency as part of BOEM's environmental impact study review. The project will sit 18 miles off the coast of Rhode Island. There will be 100 offshore wind turbines generating 704 megawatts of power to 400,000 homes in Rhode Island and Connecticut.

New England Wind (Park City Wind & Commonwealth Wind), Massachusetts
New England District is serving as a cooperating agency as part of BOEM's environmental impact study review. The project will sit 19 miles southwest of Martha's Vineyard, Massachusetts. There will be 130 offshore wind turbines generating 2,000 megawatts of power for the Connecticut and Massachusetts power grids.

Mayflower Wind, Massachusetts
New England District is also serving as a cooperating agency as part of BOEM's environmental impact study review. This project will sit 26 miles off the coast of Martha's Vineyard. There will be up to 147 offshore wind turbines generating 804 megawatts of power for the Massachusetts power grid.

Vineyard Wind 1, Massachusetts
New England District authorized this project last summer; it will sit 14 miles off the coast of Martha's Vineyard. Throughout approximately 75,614 acres of ocean, there will be 84 offshore wind turbines generating 800 megawatts of energy for the Massachusetts power grid by 2024.

USACE addresses climate change
The Biden Administration not only tasked federal agencies to work together to fight climate change, but also to develop their own plans. In response, USACE developed a



Wind energy generated offshore is transported through buried underwater cables to on- or offshore substations where the voltage is stepped up and the electricity connects to an onshore electrical grid. Credit: BOEM.

Climate Action Plan in 2021 that benefits its projects, the people working on them, and the communities they serve.

"The US Army Corps of Engineers' Climate Action Plan provides actions that demonstrate how the Corps continues to further their efforts to address climate adaptation and resilience in all aspects of Civil Works projects and operations," says Principal Deputy Assistant Secretary of the Army for Civil Works Jaime A. Pinkham. "This is a vital component of identifying the contribution of the Corps to the Administration's goals for resilient infrastructure and community preparedness."

The plan includes identifying programs and missions most at risk from climate change to ensure best use of taxpayer dollars; putting senior leaders in charge of these projects so they are held accountable; revamping supply chain policies and operations to create a more climate-resilient system; enhancing protections for workers and communities; and building a more equitable future for at-risk populations.

Wind energy benefits environment, economy

A supporter of the Biden Administration's push for wind energy, Marjaneh Issapour, director of Farmingdale State College's Renewable Energy and Sustainability Center, believes the United States could benefit from this renewable energy source in two major ways.

Issapour is a senior member of the Institute of Electrical and Electronics Engineers in Long Island where she chairs the Power and Energy Society and is a subcommittee member of the American Wind Energy Association. "Producing wind energy provides clean energy, reduces CO2s — carbon dioxide — and our carbon footprint. Producing wind energy domestically also makes us independent from oil, which hopefully would make us less exposed to international adverse situations that could cost us generations to come. It's a win-win situation."

Issapour says these locations off the mid-Atlantic and Northeast coasts of the United States are prime areas to establish wind energy for several reasons, such as having access to deep, open waters, enabling wind farm parts manufacturers, some located solely in Europe, to ship materials to this region on large cargo ships.

Regarding wind turbine construction, Issapour said their size is growing. "When you construct a building, the taller the building, the deeper the foundation has to be. Wind turbine foundations are filled in with a special gravel material that makes the turbines steady and stable. This material is produced in Canada, which also is easily accessible to this region."

While wind farms can be constructed either on- or offshore, wind energy resources tend to be stronger offshore.

The economy of the mid-Atlantic and Northeast coasts will also benefit greatly. For example, BOEM says offshore wind farm construction in North Carolina and Virginia is expected to generate nearly $2 billion for the region's economy over the next decade. BOEM has stated part of this will come from new jobs. For example, the Kitty Hawk project, once operational, will create 900 full time jobs.

When these projects are operational, the economies of these regions will further benefit. BOEM states regions with offshore wind turbines tend to experience an increase in recreation and tourism.

Part of this may be due to an increase in recreational fishing because of an increase in fish habitats. The underwater foundations that support the tall wind turbines may attract a wide variety of fish and other marine animals.

According to BOEM, perhaps the most important benefit of offshore wind farms is they help decrease the region's reliance on fossil fuels and help tackle climate change. When fossil fuels, such as oil, coal, and gas, are burned to meet our energy needs, this releases carbon dioxide, sulfur dioxide and nitrogen oxide into the air, which degrades air and water quality and contributes to climate change.

Construction and operation of the Kitty Hawk project alone, by BOEM's estimates, is expected to displace 1,330,032 tons of carbon dioxide, 860 tons of sulfur dioxide, and 703 tons of nitrogen oxide annually that would have been emitted from fossil-fuel burning facilities.

BOEM reports these projects are not only meeting federal climate change goals, but also state objectives. For example, the Commonwealth of Virginia enacted the Virginia Clean Economy Act in April 2020. This act supports development of 2,500 to 3,000 megawatts of clean, reliable offshore wind energy to be in service by 2028 and has the goal of transitioning Virginia's biggest utility companies from their current electric portfolio to 100 percent carbon-free resources by 2050.

Issapour says Americans have been slow to accept renewable energy, such as wind energy, and she would like for them to think of the possibilities. "Before you say no, just take a look at the data and learn about it. Look at the long-term benefits. Don't be short-sighted but think of the generations to come. Ask yourself—what are the benefits for me, my family, and the longevity of our planet? We forget we are the guardians of this beautiful Earth."

Possibly, in years to come, with the offshore wind farms being constructed now and those in the future, renewable energy will be just as common as boarding an airplane and climate change will be a passing breeze. **FC**

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