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EMERGING ENERGY SOLUTIONS

A series on emerging energy trends and opportunities from IFC

The Rising Tide of Offshore Wind

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Climate change is already having a visible impact on our planet, evidenced by shrinking polar ice caps, rising sea levels, warmer global temperatures, and more frequent and violent weather. These developments also have economic consequences: Climate change could torpedo progress towards the 2030 Sustainable Development Goals. Governments have set a target to keep global temperatures from rising more than 2 degrees Celsius above pre-industrial levels by the end of the century and have submitted national strategies to achieve this goal.

This will require dramatically shifting away from coal and fossil-based power in many regions by 2050. Besides climate, other factors—including energy security, the dependency on fossil fuel imports, local air pollution, and the need to create jobs—are also driving the move to other sources of electricity.

But what could take its place? Whatever it is must be clean and meet four key criteria:

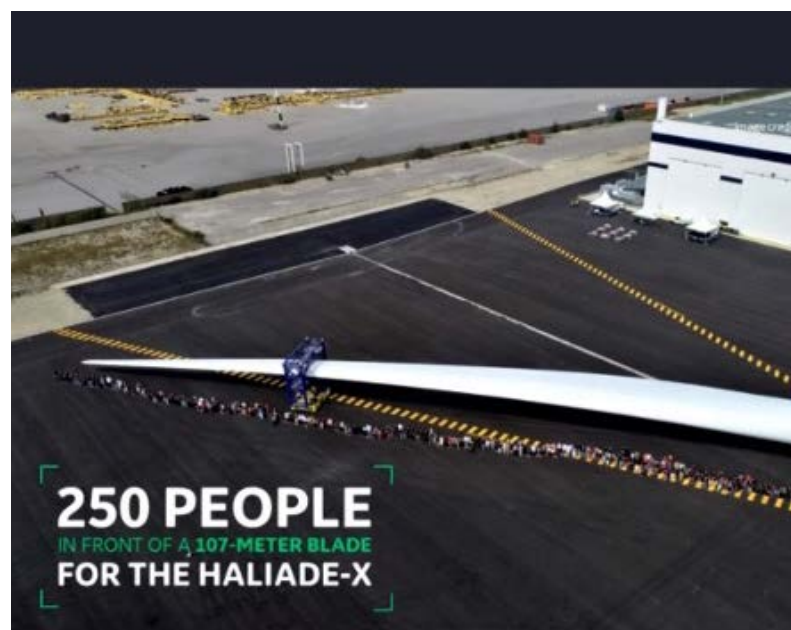
1. It has to be scalable
2. It has to be affordable
3. It has to be where you need it most
4. And it needs to have a positive economic impact

Offshore wind—harvested by turbines anchored in the ocean—fits the bill. Here's how:

SIZE MATTERS

Modern offshore wind towers are the largest pieces of rotating machinery that humans have ever produced. Consider General Electric's Haliade-X turbine, which is currently undergoing testing in the Port of Rotterdam. It is the biggest wind turbine in the world, standing 260 meters tall—almost as high as the Eiffel Tower. Each blade is 107 meters long—as long as a soccer pitch—and has enough space inside for several double-decker buses. Each turbine generates 12 Megawatts, enough to power 16,000 European households. A 750-megawatt wind farm could power 1 million households. The first units will be shipped in 2021.

In short—offshore wind has scale to spare.



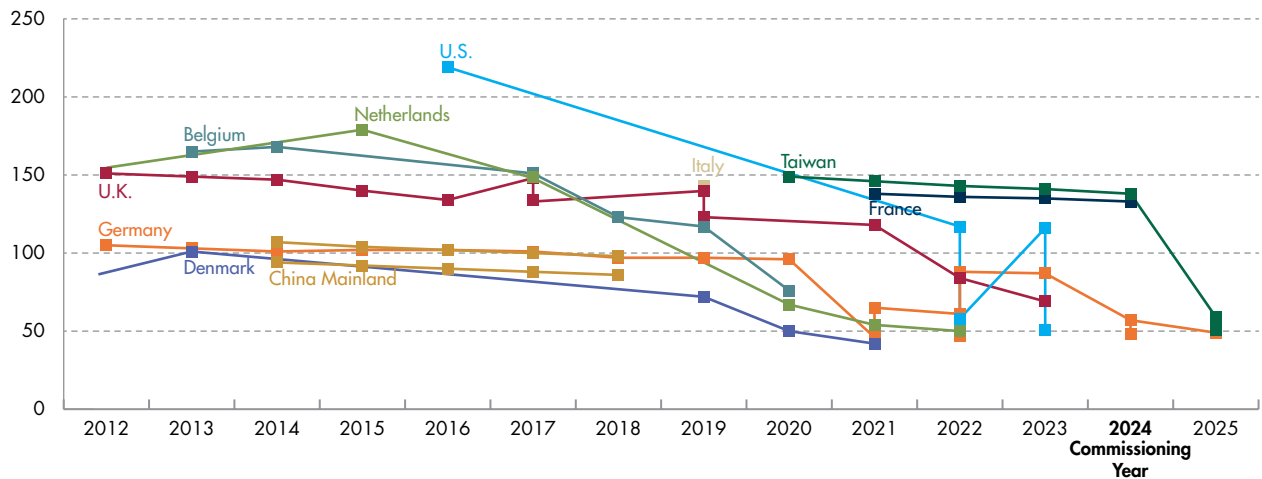
PRICES ARE TUMBLING DOWN

Offshore wind used to be much pricier than onshore wind, costing up to \$200 per megawatt-hour. But in 2015, prices began to fall quickly. Between 2016 and 2017, prices fell by about half, below \$100 per megawatt-hour, thanks to improved technology, economies of scale, and improvements in efficiency. In September 2019, bids in the United Kingdom's most recent offshore

wind auction fell below \$50 per megawatt-hour for projects with a 2023 commissioning date.

This means that offshore wind in Europe is starting to compete head-to-head, with no subsidy, against conventional generation. In fact, within five years, offshore wind is expected to be the cheapest form of energy in the United Kingdom, generating power from abundant resources in the North Sea.

LEVELIZED OFFSHORE WIND BIDS (USD/MWh by Year of Commissioning)



Source: BNEF H2 2018 Offshore Market Outlook.

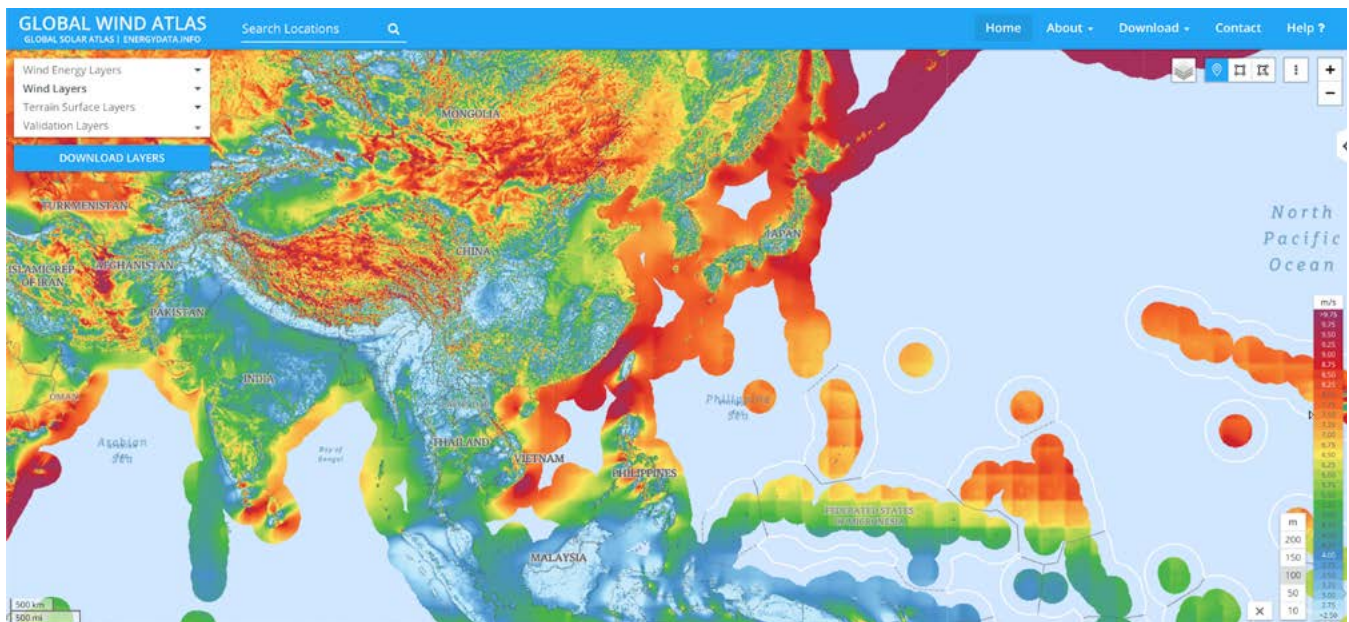
POWER WHERE YOU NEED IT

Offshore wind power was born in the North Sea and remains focused in Europe. But to make a difference for the climate, it needs to be competitive in places dominated by coal. Today, Asia accounts for three-quarters of global coal use. As luck would have it, there's a lot of good wind in Asia. But there are a lot of people too, making land-based wind farms—and solar farms for that matter—hard to scale-up.

But Asia has particularly good offshore wind resources, and as it happens, these winds are often strongest close to major cities and demand centers. That means that

offshore wind can become a big part of the energy mix in countries like China, Vietnam, and India, where coal generation still dominates.

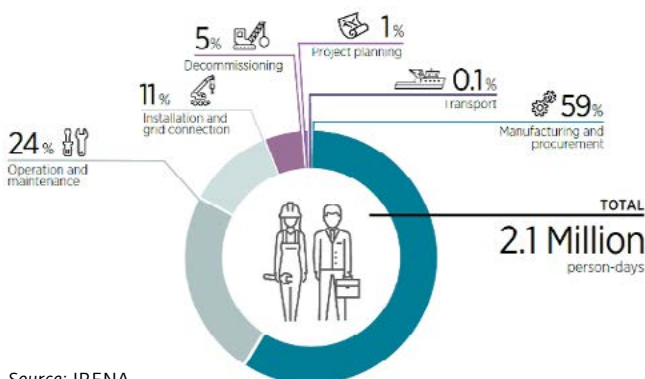
According to the recent World Bank Group report, *Going Global: Expanding Offshore Wind in Emerging Markets*, many key emerging markets are ripe for harnessing offshore wind. The report estimates that only eight markets—Brazil, India, Morocco, the Philippines, South Africa, Sri Lanka, Turkey, and Vietnam—have the technical potential to generate about 3.1 terawatts, which greatly exceeds their collective power demand.



Source: Global Wind Atlas. See www.globalwindatlas.info.

DRIVING ECONOMIC BENEFITS AND ENERGY SECURITY

The development of an offshore wind farm is a complex and labor-intensive process. The International Renewable Energy Agency (IRENA) estimates that building a 500-megawatt offshore wind farm requires 2.1 million person-days of work for manufacturing, installation, and operations. This represents a tremendous opportunity for job creation and economic development, focused not only on the wind farms themselves but also on associated infrastructure, including ports, logistics, and transmission. In northeast England, a region once dominated by oil and gas, there are now an estimated 15,000 people working in the offshore wind sector, covering as many as 110 long-term, highly skilled roles.



Source: IRENA

The economic benefits of offshore wind are clear. What's more, offshore wind helps to reduce energy imports, increase energy security, and positively impact foreign trade balances.

GOING FORWARD

These factors are putting offshore wind front-and-center in the fight against climate change. But how can we get it where it is most needed—in Asia and emerging markets?

The World Bank Group is doing something about that. In March 2019, IFC and the [Energy Sector Management Assistance Program \(ESMAP\)](#) launched the [World Bank Group Offshore Wind Development Program](#), a \$5 million initiative funded by the United Kingdom, that works with emerging market governments to accelerate the adoption of offshore wind. We're also collaborating with the Global Wind Energy Council (GWEC) and their Offshore Wind Task Force, which brings together leading offshore wind developers, equipment manufacturers, and service providers. The program will support knowledge generation (including the Going Global report), sponsor in-country capacity-building events, and support detailed roadmaps to guide the development of offshore wind resources.

SUMMING UP

Developing offshore wind resources makes sense from a climate perspective, a jobs perspective, and an economic perspective. The resource exists, demand is strong and growing, and it has a positive climate change impact. Its potential is unmistakable—from 2011 through 2018, [it grew fivefold](#). As of the end of 2019, 29 gigawatts of generating capacity had been installed, but the potential is much greater: [according to recent data from the ESMAP-IFC Offshore Wind Development Program](#), the total technical potential in 48 emerging markets for offshore wind is 15.6 terawatts.

Investments are likely to skyrocket, with the [IEA](#) [expecting another 15 fold increase to 2040 and up to \\$1 trillion of investment](#). IFC is eager to finance new offshore wind in emerging markets, adding to the 4 gigawatts of onshore wind it has already financed over the past ten years.

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