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## **This will make waves: A new era of energy transition in the North Sea**

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The North Sea is in pole position when competing for a global pioneering role as a driver of the energy transition. With its oil and gas deposits, it has been indispensable for Europe's energy supply for decades. It is already clear: this part of the Atlantic will again play an important role in achieving the global climate goals - as an excellent place for the application of new solutions and approaches in the energy industry.

The road to decarbonization is long and the latest IPCC report on climate change by the United Nations makes it absolutely clear that it is time to act. Meeting the challenges of climate change requires fostering and expanding collaboration between countries, governments, partners, customers and supply chains. This is the only way to fully exploit the potential of the North Sea.

### **The North Sea – reshaping the future**

The North Sea has a considerable potential for the extraction of clean energy. Syllied waters and stormy winds make them one of the most suitable locations for offshore wind turbines. The geological conditions have made it possible to store natural gas over millions of years - ideal conditions to store carbon dioxide in the future.

The challenge: The wind conditions in the North Sea are among the roughest weather conditions on Earth. The conditions on the sea floor as well as the tides also make the installation and maintenance of existing and in the future required infrastructures. Ultimately, the energy systems must be robust and at the same time intelligent in order to guarantee reliable operation even under rough environmental conditions. If this succeeds, the North Sea can become a load-bearing pillar for the transformation of the global energy landscape.

If the development of a networked, low-carbon energy system in the North Sea is successful, it can be used technically anywhere. A crucial prerequisite for versatile industrial growth, combined with ever less dependence on fossil fuels. At the same time, an increasing increase in green technologies such as wind power can be expected at the same time. It is these technologies that guarantee the energy security and independence of Europe in the best possible and sustainable manner.

## **A sea of possibilities for the expansion of wind energy**

Offshore wind power has become increasingly important since the early 2000s. The cost of offshore wind energy has dropped faster than expected and can become an affordable backbone of clean electricity generation in the future.

In 2020, around 1,500 offshore wind turbines were on the net in Germany. Their total capacity was around 7,700 megawatts (MW). By 2030, this performance is to increase to 30 gigawatts (GW). To achieve this, for example, Siemens Energy will complete the offshore network connection projects Dolwin4 and Borwin4 by 2028. Dolwin4 and Borwin4 will transport up to 1.8 gigawatts (GW) Green wind power from several wind farms in the German North Sea in a loss of loss and can thus cover the need of a big city like Hamburg with 1.8 million inhabitants. The proportion of renewable energies in the German power supply is expected to increase to 80 percent by 2030. In order for Europe to become climate neutral by 2050, the offshore wind capacity must grow from 28 GW to well over 300 GW today.

With the signing of the Esbjerg Declaration on May 18, 2022, four North Sea resort states (Germany, Denmark, the Netherlands and Belgium) have declared offshore wind power plants with a capacity of 65 GW by 2030. By 2025, electricity generation is to increase to 150 GW, which includes half of the offshore wind capacity provided by the EU.

In the North Sea as well as beyond its coastal lines, green hydrogen, which is generated, for example thanks to electrolysis systems from water and with wind power, will also play an important role in long-term energy storage. In order to use this extremely promising potential as best as possible, technologies for storing and transporting hydrogen and the production of synthetic fuels such as e-methanol or e-kerosine are necessary. These could be used, for example, in the difficult to electrify ship and aviation.

### **High efficiency, low emissions**

Building an infrastructure for renewable energy and hydrogen is not an easy undertaking. Planning, approval and viable operating models require both time and financial investments. Since fossil fuels will also be used during the transition period, emissions from their production must be minimised. Most offshore platforms powered by fossil fuels still use gas turbines to generate electricity and drive compressors. However, this has changed fundamentally in recent years. Today, thanks to technology upgrades, we are able to significantly reduce the emissions generated during operation by means of plant modernization.

Even if the goal is an uncompromising net-zero balance sheet (Net Zero), we cannot do without fossil fuels overnight. In 2021, for example, Germany generated 14.5 percent of its electricity using natural gas. Alternatives such as electricity generated by connected wind

farms or hydrogen-capable turbines could lead the way here. The offshore wind and oil and gas industries should work even more closely together to electrify offshore platforms. Siemens Energy is already successfully implementing this with the Hywind Tampen project in Norway.

### **Storage technologies and interconnected networks**

The natural gas produced in the North Sea can be cleaned by carbon capture and storage technologies. Heavy industry is planning common networks in ports such as Rotterdam (Netherlands), Teesside (Great Britain) and Wilhelmshaven for the transport and storage of the captured carbon dioxide. This prevents the CO<sub>2</sub> from escaping into the atmosphere. In addition, the existing oil and gas infrastructure is to be converted for carbon dioxide capture.

These networks will help to save costs in the future. The growing number of connecting lines between the countries strengthens the protection against failures of any gas supplies. In addition, there are plans to create artificial energy islands that will serve as nodes in the sea. Some of these will have electrolyzers that can produce clean hydrogen from seawater.

### **LNG terminals as a cornerstone of future energy supply**

At least since the attack on Ukraine, LNG terminals have also become the focus of politics and society. LNG stands for "Liquefied Natural Gas" and means liquefied natural gas at a temperature of around -161 degrees Celsius. Germany is currently importing the raw material, which is so important for German industry and business, via ports in France or the Netherlands, delivered by special tankers. In contrast to German ports, our neighboring countries already have LNG terminals. The required liquefied natural gas is unloaded and gasified again in order to then be fed into the gas pipeline network, which also leads to Germany.

It is undisputed: significant changes are needed in the gas industry for the benefit of the entire national energy infrastructure. The expansion of LNG terminals must therefore be given high priority, if it ultimately ensures a sustainable and increasingly green gas and energy industry - with LNG terminals as the new north German economic pulse generator.

### **Cooperation to develop innovative technologies for the energy transition**

Across Europe there are examples of parts of the economy being rapidly decarbonised. In Germany, this can be observed above all with electricity. In 1990, the share of lignite and hard coal as well as nuclear energy was 84 percent - today it is only 40 percent.

The energy landscape is experiencing an unprecedented shift away from fossil fuels to renewables. In the end, a combination of different factors will determine the success or failure of all of our energy futures. However, it is already becoming clear: the North Sea will

be as important to the future of clean energy as it was to the fossil fuel era. Like no other mega-project, it stands for the energy transition. Because the energy transition will only succeed if we all pull together - in partnership, trusting, with many years of experience and innovative technologies.