What is Offshore Energy?

Offshore energy is such an important industry in Scotland. It powers homes, businesses and most aspects of life in general and it's also playing a major role in tackling climate change.

You are probably aware of the more traditional offshore energies of oil and gas, which will continue to play a part in our energy needs for some time to come. But to help with the energy transition and working towards net zero, we also have hydrogen, carbon capture and storage, offshore wind, wave and tidal.

All of these new technologies are helping us shift towards a greener low carbon future by producing the energy we need in renewable and sustainable ways.

Types of offshore energy

Wind farms

Turbines generate electricity from the force of the wind out at sea, which is generally stronger than that onshore, therefore more efficient. The blades spin a rotor inside the turbine and mechanical energy is converted into electrical energy which is then supplied to the electricity network.

Oil and Gas

The traditional method of energy production, this involves the creation of offshore rigs and platforms in areas of the seabed that have been identified as having good oil and gas reserves. Wells are created to enable the seabed to be drilled, and oil and gas is extracted, which is then transported to facilities where it is utilised for energy.

Carbon Capture, Usage and Storage (CCUS)

This technology is a set of methods used to stop carbon dioxide produced from facilities such as power stations and manufacturing plants from reaching the atmosphere. Captured carbon is pumped out to sea to be stored deep under the water in reservoirs, which could be those previously used for oil and gas production. This can then be stored permanently, or it can be utilised to make products such as synthetic fuels or construction materials.

Hydrogen

Hydrogen can be produced from a variety of resources, such as natural gas and wind power. The most sustainable method is using renewable energy, such as wind, to create green hydrogen, which means that there are no harmful emissions created during the hydrogen production. Once hydrogen is produced, it can be stored and used for future energy needs, such as heating homes or fuel for vehicles.

Wave and tidal

In a similar way the turbines harness the power of the wind for energy, this type of energy uses the power of water to create electricity.

The image below demonstrates how some of this works.

Did you know?

Oil and gas production supports over 200,000 jobs in the UK, of which around 84,000 are in Scotland.[1]

Upstream oil and gas production emissions has decreased by 28% since 2018, reducing the sector's impact on the environment.[1]

The offshore industry could invest around £450bn between now and 2040 in oil and gas, wind, hydrogen and carbon capture and storage.[1]

Electricity will become the largest energy source, driven by offshore wind.[1]

Based on the Scottish Government's Renewable Electricity Output Calculator, 1GW of wind capacity is enough to power more than 560,000 homes and currently Scotland's operational offshore windfarms generate 1.9GW - so that's enough for just over 1 million homes.[2]

[1] OEUK

[2] Crown Estate Scotland

Exciting energy projects in Scotland

Scotland currently has eight operational offshore windfarms, but there are another five in the planning stages and two already under construction - Neart na Gaoithe (NnG) and Moray West. This demonstrates just how important offshore wind energy is and will continue to be.

Scotland is home to Hywind Scotland, the world's first floating offshore windfarm, and also the Kincardine Project, the world's largest offshore floating windfarm.

The Acorn Project is Scotland's only advanced CO^2 transport storage and network. It reuses existing energy infrastructure to safely store away carbon emissions deep in the North Sea. The target is to store between 5-10 million tonnes of CO^2 per year by 2030.[1]

[1] Acorn: Growing Our Decarbonised Future - The Acorn Project

The science, technology and engineering behind offshore energy is fascinating and you can find out more about this at MyEnergyFuture. As you'll see throughout this new area of Planit, offshore energy also incorporates many different types of careers, not just those related to STEM.