

Energy to power our lives

Coal, oil and gas are called "**fossil fuels**" because they have been formed from the organic remains of prehistoric plants and animals. Although the figure changes fossil fuels provide about **66%** of the world's electrical power, and **95%** of the world's total energy demands (including heating, transport, electricity generation and other uses). **Coal** provides around **28%** of our energy, and **oil** provides **40%**. Oil is easier to get out of the ground than coal, as it can flow along pipes. This also makes it cheaper to transport. **Natural gas** provides around **20%** of the world's consumption of energy, and as well as being burnt in power stations, is used by many people to heat their homes. It is easy to transport along pipes.

Fossil fuels are **not** a renewable energy resource. - Once we've burned them all, there isn't any more, and our consumption of fossil fuels has nearly doubled every 20 years since 1900.

Advantages

- Very large amounts of electricity can be generated in one place using coal, fairly cheaply.
- Transporting oil and gas to the power stations is easy.
- Gas-fired power stations are very efficient.
- A fossil-fuelled power station can be built almost anywhere, so long as you can get large quantities of fuel to it. Didcot power station, in Oxfordshire, has a dedicated rail link to supply the coal.



Disadvantages

- Basically, the main drawback of fossil fuels is pollution. Burning any fossil fuel produces carbon dioxide, which contributes to the greenhouse effect warming the earth.
- Burning coal produces more carbon dioxide than burning oil or gas. It also produces sulphur dioxide, a gas that contributes to acid rain. We can reduce this before releasing the waste gases into the atmosphere.
- Mining coal can be difficult and dangerous. Strip mining destroys large areas of the landscape.
- Coal-fired power stations need huge amounts of fuel, which means train-loads of coal almost constantly. In order to cope with changing demands for power, the station needs reserves. This means covering a large area of countryside next to the power station with piles of coal



Nuclear power is generated using Uranium, which is a metal mined in various parts of the world. The first large-scale nuclear power station opened at Calder Hall in Cumbria, England, in 1956. Some military ships and submarines have nuclear power plants for engines. Nuclear power produces around 11% of the world's energy needs, and produces huge amounts of energy from small amounts of fuel, without the pollution that you'd get from burning fossil fuels.

Advantages

- Nuclear power costs about the same as coal, so it's not expensive to make.
- Does not produce smoke or carbon dioxide, so it does not contribute to the greenhouse effect.
- Produces huge amounts of energy from small amounts of fuel.
- Produces small amounts of waste.
- Nuclear power is reliable.



Disadvantages

- Although not much waste is produced, it is very, very dangerous. It must be sealed up and buried for many thousands of years to allow the radioactivity to die away. For all that time it must be kept safe from earthquakes, flooding, terrorists and everything else. This is difficult.
- Nuclear power is reliable, but a lot of money has to be spent on safety - if it does go wrong, a nuclear accident can be a major disaster. People are increasingly concerned about this - in the 1990's nuclear power was the fastest-growing source of power in much of the world. In 2005 it was the second slowest-growing.

Renewable Energy

Renewable energy resources are ones that won't run out **Example:** Winds will keep on blowing, whether we use the energy or not. So Wind power is a renewable energy resource. Biomass, geothermal, hydroelectric, WIND, WAVE and TIDE are also examples of renewable energy.

Why do we need to use Renewable Energy?

Climate change is the greatest environmental, economic and social challenge facing the planet. Unless the global emissions of carbon dioxide and other greenhouse gases from energy generation and other human activities peak by around 2015 and then rapidly diminish, the world will probably see a global temperature rise of 4°C by around 2060 resulting in famine and droughts in many parts of the world, significant sea level rises, and an increasing risk of further catastrophic climate changes. Even without climate change oil and other fossil fuels will begin to run out so we need to plan for a more sustainable and secure energy future. In Europe the

use of renewable energy has doubled in the last decade to 9%.



Marine Energy Pembroke is a group of people working together to develop marine renewable energy in Pembroke.

And what does Pembroke have to offer?

Pembroke has huge potential. You only have to visit the coastline here to see the power in the waves and a recent study confirmed that Pembroke has the highest concentration of wave resource in Wales. We also have significant tidal streams where the water moves at great speed, particularly around Ramsey Island - and of course the wind, there is plenty of that – In fact there is an awful lot of untapped energy in and around the waters off Pembroke.



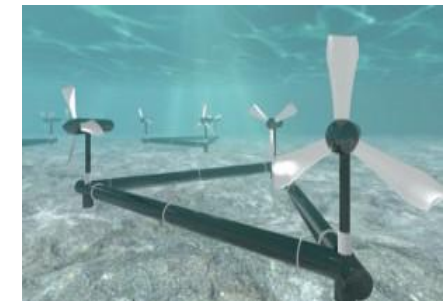
But it's not just the natural resources that make Pembroke a potentially great place for Marine Renewables. What else sets it aside from other areas?

In addition to the excellent wave/tide and wind resource that Pembroke has to offer, there are a number of other factors that set the area apart. There are excellent grid connection possibilities, which is in part due to the Pembroke Power Station. We have world class research on our door step with links to the universities in Wales, Pembroke College and the Marine Energy task Group. Because of the oil and gas industry already established on the Haven there is a great opportunity for transferrable skills. We have a history of working together in Pembroke and because of the oil and gas industry and the fact that Pembroke is so special in environmental terms a lot of research data has been collected. Another factor is the world class port facilities we have on the Haven that could service a new Marine Renewable industry.



So as you've mentioned with all this great potential are there companies looking to develop marine energy in the area?

Yes – on the wind front there is Far Offshore Renewables, who are looking to develop a new floating wind turbine device which is currently being tested on a small scale off the North Pembroke coastline. Looking at Wave we have 2 companies, Wave Dragon who are looking at testing a device off the Marloes peninsula and Marine Energy Limited who are interested in an area off south Pembroke. Looking at tapping into energy from tides



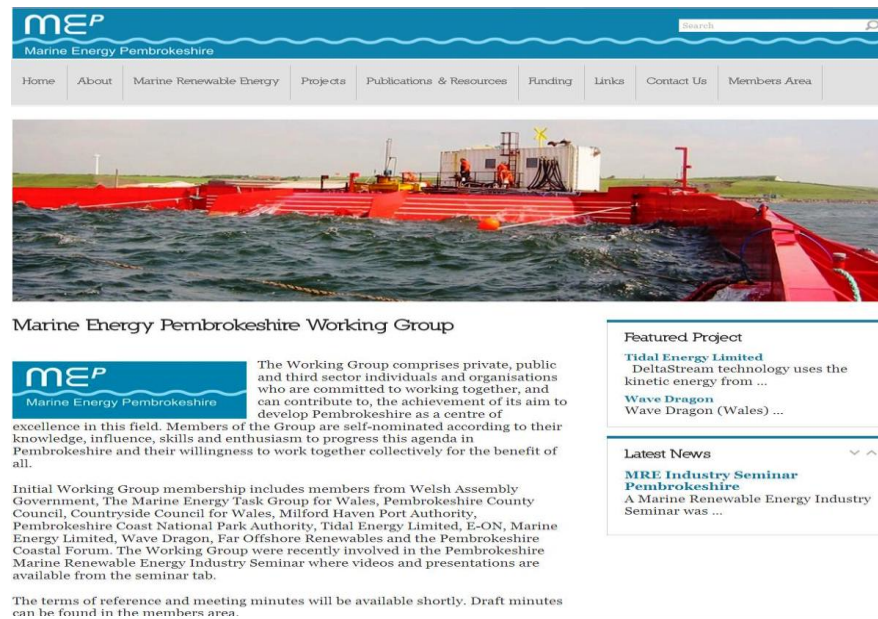
there is E.On and Tidal Energy Limited who are both looking at tidal turbines in Ramsey Sound. It is worth mentioning that these companies are particularly interested in Pembrokeshire not only because of the wind/waves and tide but because of the onshore support services just mentioned.

Are we close to seeing a wind, wave, or tidal device in the water soon?

Yes! Tidal Energy Limited have received their consents or planning permission to place a tidal turbine in the water off Ramsey Island. It will be tested for a year before being removed. This is the start of a very exciting time for Marine Renewable Energy in Pembrokeshire - And hopefully the start of a new, green sustainable industry!

How can we find out more information about Marine Energy in Pembrokeshire?

You can log onto our website www.marineenergypembrokeshire.co.uk which has been set up to provide information and promote Pembrokeshire as a Hub for Marine Renewables. We hope this website will become a "one stop shop" for developers, investors and the public wanting to know more about the projects, the resource, consenting, funding, research and infrastructure.



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Marine Energy Pembrokeshire Working Group

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The Working Group comprises private, public and third sector individuals and organisations who are committed to working together, and can contribute to, the achievement of its aim to develop Pembrokeshire as a centre of excellence in this field. Members of the Group are self-nominated according to their knowledge, influence, skills and enthusiasm to progress this agenda in Pembrokeshire and their willingness to work together collectively for the benefit of all.

Initial Working Group membership includes members from Welsh Assembly Government, The Marine Energy Task Group for Wales, Pembrokeshire County Council, Countryside Council for Wales, Milford Haven Port Authority, Pembrokeshire Coast National Park Authority, Tidal Energy Limited, E-ON, Marine Energy Limited, Wave Dragon, Far Offshore Renewables and the Pembrokeshire Coastal Forum. The Working Group were recently involved in the Pembrokeshire Marine Renewable Energy Industry Seminar where videos and presentations are available from the seminar tab.

The terms of reference and meeting minutes will be available shortly. Draft minutes can be found in the members area.

Featured Project

Tidal Energy Limited
DeltaStream technology uses the kinetic energy from ...

Wave Dragon
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