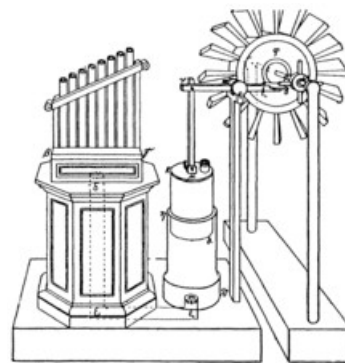
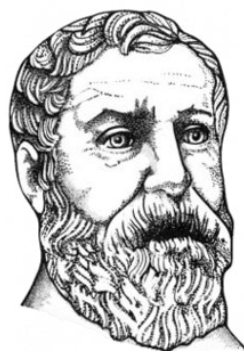




## Renewable energy – off-shore and on-shore wind

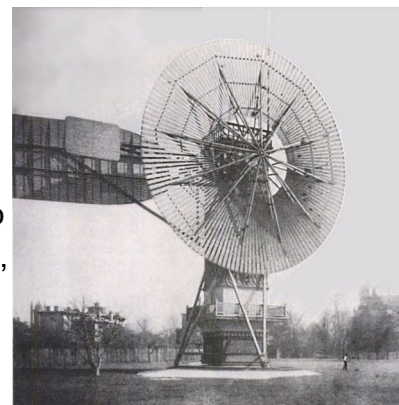
Very soon after the new UK government came into power, it was announced that we would be building more on-shore wind farms. This has been contentious mainly because of the visual impact. Building on-shore is less costly than off-shore but connecting to the national grid can still mean new electricity pylons in the countryside. Wind power is an essential component in our strategy to reduce carbon emissions. In the first quarter of 2024, almost 40% of the UK energy was from wind and only about 36% from fossil fuels. Inevitably, we will have more wind turbines to enable us to reach net zero.

Wind power has been with us for much longer than most of us realise, though it is relatively recently that we've used it to generate significant amounts of electrical power. In the first century AD, the Greek mathematician and engineer Hero of Alexandria invented a windwheel that powered a pipe organ.



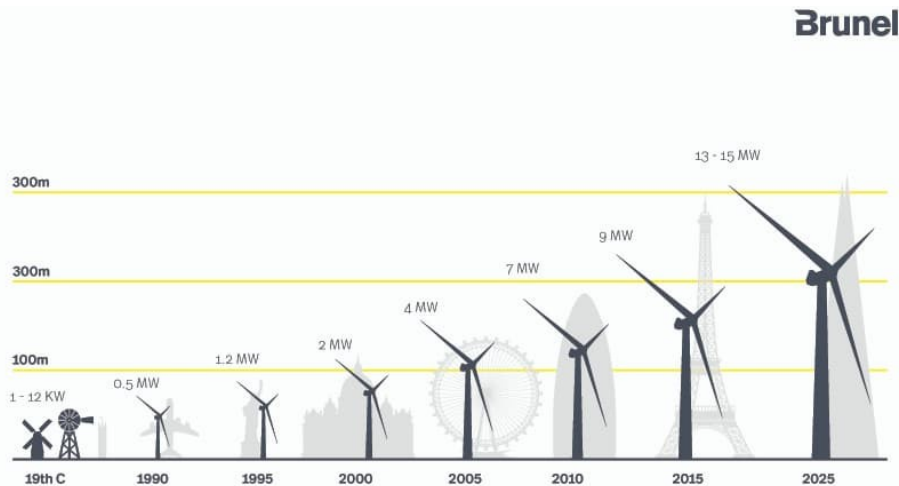
*Hero of Alexandria and a reconstruction of his pipe organ with windwheel  
(Wikipedia)*

It wasn't until the 7<sup>th</sup> or 8<sup>th</sup> century that windmills came into use, in Persia (Iran), for grinding wheat and pumping water. Subsequently, windmills spread across Europe and we can still see a few in England that have been restored to full working order. Electricity was discovered in the 18<sup>th</sup> century but it was not until 1887 that James Blyth built a turbine to generate power to light his house in Marykirk, Kincardineshire. Blyth even offered to light the main street in Marykirk but was turned down as people thought electricity to be the work of the devil. In 1888, Charles Brush of Cleveland, Ohio built a machine with a diameter of 50 feet (17 metres) that generated roughly 12 kW. The design of modern wind turbines was largely the work of Poul la Cour from Denmark, who in 1895 showed that having few blades was more efficient.



*James Blyth's wind turbine  
(Renewable Energy World)*

The modern design of wind turbines developed rapidly in the latter half of the 20<sup>th</sup> century particularly as new materials became available that allows larger and larger ones to be built. The first off-shore installation was in Denmark in the 1980s but now we have them around a lot of our coastline.



*Growth of wind turbines, 9<sup>th</sup> century to 2025 (www.brunel.net)*

The UK is well placed to take advantage of off-shore wind power. We have a large continental shelf with fairly shallow waters and plenty of wind, most of the time. With stronger and more consistent wind than on-shore, off-shore wind turbines are more efficient, have a higher energy output and there are no obstructions to the wind. Marine life can also benefit from these structures as they provide artificial reefs where life can proliferate. Such turbines can be much bigger than those on land with their sound being lost in the distance from the shore. Conversely, there can be adverse impacts on marine life from the disturbance during construction, the installation of cables and the sub-sea noise that may upset whales and dolphins. Maintenance is also a challenge and the overall costs of construction and operating costs are higher than on-shore wind. Whilst off-shore wind power does reduce our carbon footprint, it does so by less than on-shore.

On-shore wind power is very cost-effective and highly competitive with natural gas. It is much cheaper than off-shore and the payback on investment can be as short as two years. Connecting to the grid is easier with shorter cabling distances, which reduces transmission losses. The construction is simpler and takes less time than almost any other sort of power. The main limitations of on-shore wind are due to the variable nature of the wind, which means some back-up generation is needed. There is also the visual impact to consider. These turbines need to be installed on high ground to capture the best wind. Consequently, they stand out on skylines and views, which some people dislike. On the other hand, this is little different to the large electricity pylons that march across the countryside. There has been some concern that the presence of such large structures in the landscape will harm wildlife, particularly bird and bats. However, the RSPB and other conservation groups think that the fight against climate change is more important than the very small amount of harm that may be caused. All wind turbines make some noise and if

on-shore installations are near residential areas, that noise can be quite intrusive. It is therefore critical that they are sited sufficiently far away from buildings. On-shore wind power generation is sustainable, cheaper and cleaner but it is part of the mix.

The wind is not constant and is usually less in the summer months, though we use less power then. We do have more solar power at the same time. Even so, supply may not meet demand and we have to switch on more gas power stations. If we are to cut our emissions to net zero, we have to build electricity storage – batteries or pumped water storage (hydropower), thermal storage, mechanical storage (flywheel technology) – so that we can draw on this when demand is higher than supply. This should go along with reducing energy consumption by using more efficient appliances and being more careful in our use of electricity. We benefit from helping to save the planet and save some money too.

### **Richard Marshall**

Do you have an idea for an activity or project that would help everyone cope with Climate Change or related topics? We can provide support, help develop your ideas, even cover some costs such as poster printing etc. You could use our logo. Get in touch with our chair, Richard Marshall:

[marshalr@btinternet.com](mailto:marshalr@btinternet.com)