"Fast Track Fusion Development of Fusion Power"
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Dr Ward briefly outlined how fusion power is obtained from the energy emitted when hydrogen atoms fuse to form helium. In the sun this is a very slow process and so for practical fusion power purposes, deuterium or tritium are used to bombard a lithium target and achieve fusion in seconds, creating helium and a neutron that carries the majority of the energy. Successful fusion requires temperatures in excess of 100 million ^{o}C. These temperatures can be achieved using microwave heating and containing/insulating the resulting plasma using powerful electromagnets.
In the 1970's, fusion was hailed as the answer to the world's energy problems. However 30 years on it seems to have fulfilled the early criticism of "always being 30 years away". Dr Ward explained that although major progress had been made, the very high costs of research coupled with the continued lack of the necessary level of resources means that commercial fusion power is still many years away. The progress that has been made is as result of collaboration between a number of countries and the feasibility of fusion power has being clearly demonstrated. The **J**oint **E**uropean **T**orus (JET) facility at Culham is the largest in the world and is capable of yielding 16 MW of power, but is only a research tool. It has shown that with about one hundredth of a gram of fuel at any one time, the amount of lithium in a laptop battery and half a bathtub of water it is capable of generating sufficient electricity to meet the UK per capita requirements for one year.
JET has been used to design a 500MW research facility in France – **I**nternational **T**okamak **E**ngineering/**R**esearch (ITER). ITER is a global collaboration between the EU, Japan, China, India South Korea and the US although the US has declined to contribute any money for the current year. Unlike JET it uses superconducting magnets and it purpose is to prove the scientific and technological feasibility of a full-scale fusion power reactor. It is a further experimental step between today's studies of plasma physics and future electricity-producing fusion power plants but it has taken 15 years to get approval for ITER and it is not expected to be commissioned until 2016. Although there is much R & D work still to be done in the area of materials, Dr Ward said that there were no major hurdles foreseen. The information generated by ITER will lead to the building of a demonstration power plant, which would then provide the necessary experience to achieve commercial plants.
An EU strategic energy technical plan recommended setting up a demonstration plant as soon as resources were available which could lead to energy production in 25 years. However, with a shortage of qualified personnel, budgets already being cut and with global R&D spending on all forms of energy running at only about 0.3% of turnover, Dr Ward was not optimistic that this could be achieved. More information is available on www.fusion.org and www.iter.org .

Given on Wednesday 13 February at the Royal Agricultural College