

The Fast Track to Fusion Power

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Abstract: World energy use is predicted to double in the next 40 years. Currently 80% is provided by burning fossil fuels, but this is not sustainable indefinitely because i) it is driving climate change, and ii) fossil fuels will eventually be exhausted (starting with oil). The resulting potential energy crisis requires increased investment in energy research and development (which is currently very small on the scale of the \$3 trillion p.a. energy market, and falling). The wide portfolio of energy work that should be supported must include fusion, which is one of very few options that are capable in principle of supplying a large fraction of need (arguably, depending on one's view of fission and on the chance of bringing down the cost of solar power, the only one that can do so in an environmentally responsible and affordable way). The case for fusion has been strengthened by recent advances in plasma physics and fusion technology that are reflected in the recent European Fusion Power Plant Conceptual Study (PPCS), which addresses safety and cost issues. The big questions are – How can we deliver fusion power as fast as possible? How long is it likely to take? I will argue for a core world fusion development programme (treated as a project, with milestones etc.) focussed on the fast-track delivery of fusion power. This will require widespread agreement on a fast track reference programme. I shall summarise the main results of the PPCS and describe a fast-track model developed at Culham, which is intended to stimulate debate on the way ahead and the resources that are needed.