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While employed by the UKAEA during the early 1980s my section in the Engineering Design Division of the Culham Fusion Laboratory performed a wide variety of technology studies on fusion power plants. During the latter part of the 1 990s our Company has contributed technically to a new generation of studies on Spherical Tokamak (ST) fusion power plants as a consultant. I therefore feel that I have the experience and intellectual freedom to take a relatively unbiased engineering view of the progress over that period and to assess the current feasibility of fusion power in general terms.

The world overall energy situation is such that the twenty first century will see a massive demand for growth in power, probably by a factor of ten or more, driven by the demands for growth in the under-developed nations. This can only be provided economically by high power density sources such as fossil fuel and nuclear power. It is in the worlds interest that such growth should not follow the Western route through fossil fuels, and of the nuclear options fusion has the potentially better environmental characteristics in terms of emissions, waste disposal, reprocessing and safety.

It seems to me paramount to Western interests to help the underdeveloped nations to acquire clean power and to assess the value of this investment over a much wider economic scenario than the energy sector alone, for example, taking account of the reduced foreign aid burden of these nations becoming more self sufficient. If the development costs can be absorbed against such justification, the technology could then be adopted in the West retrospectively at production cost so as to alleviate the impact of the unavoidable transitional cost increase in moving from cheap but unacceptable fossil fuels.

The studies in which I took part in the 1980s showed the economic feasibility of nuclear fusion to be questionable at that time. However the characteristics of the recent ST power plant designs are very much more promising, especially through having a credible maintenance philosophy commensurate with the life of structural materials in a fusion environment. ST's are neutronically efficient, capable of breeding using only the outboard blanket region and the design allows for removing superconducting coils well away from the nuclear environment. Economic studies give very favourable electricity costs for a production ST plant relative to other power options such as fossil fuel and fission when the entire fuel cycle is considered.

Through the steady progress in plasma parameters and materials over the final quarter of the 20^{th} Century it is now

possible to conceive a credible development program leading with confidence to a ST power plant with acceptable commercial characteristics in the first quaffer of this Century.

In summary, nuclear fusion will be able to resolve in the mid-term many of the problems raised in the PIU Energy Policy Review scooping note.

Alan Bond
Managing Director