

Economic, safety and environmental characteristics of commercial fusion power plants

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Abstract

This paper gives an integration of the key economics, safety and environmental results from extensive studies, in the European Union and the United States of America, of:

- conceptual designs of commercial fusion power plants;
- analyses of their safety, environmental impacts and economic characteristics.

A number of conceptual designs for commercial fusion power plants have been developed within the European Power Plant Conceptual Study (PPCS) and the American ARIES series. These spanned a range from relatively near-term, based on limited plasma physics, materials physics and technology extrapolations, to designs based on greater extrapolations. Analyses have been made, using well-authenticated models, of the safety and environmental impacts of the plants and of the cost of generating electricity. The results demonstrate the following main points.

- Fusion has very well-attested and attractive inherent safety and environmental advantages, in particular: limited consequences of the worst possible accidents; no need for repository disposal of activated material produced by the operation and dismantling of the plant.
- The cost of fusion electricity is likely to be comparable with that from other environmentally responsible sources of electricity generation;

The analyses also show which plasma, materials and engineering parameters are the keys to improving further the economics of fusion.