

Socioeconomic and environmental impacts of bringing the sun to earth: A sustainability analysis of a fusion power plant deployment

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Abstract:

Producing electricity by nuclear fusion on Earth in this century is pursued by the academia and governments. Apart from the environmental and energy security benefits, fusion energy deployment would stimulate economic growth and employment. This research provides novel results of the global socioeconomic (value added, employment) and environmental (CO₂) effects of the investments in a fusion power plant of 1.45 GW hypothetically deployed in Europe. A multi-regional input-output approach is used. Results show a multiplier effect in the production of goods and services of 2.2 (3.6 considering induced effects). The most benefited are Europe (47%) and United States (20%), due to the investment phase. In O&M, China and Japan arise as important suppliers. Most of value added would be captured in Europe (48%) and the United States (28%), being mining, construction and business services the most benefited activities. Intensive in employment generation, it would create 183 thousand full-time equivalent jobs, mainly in Europe (46%) and China (21%). The carbon footprint would be 11.4 gCO₂/kWh mostly originated in Europe, United States and Japan, with a similar share. When considered, induced effects have a relevant impact on results. Despite the limitations, ex-ante evaluations are essential in setting priorities for fusion technology development.