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The potential socio-economic impact of a breakthrough in the technology of particle accelerators

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More than 30,000 particle accelerators are in use in the world. The market for medical and industrial accelerators represents the largest one (80% for radiotherapy and ion implementation, 9% for other industrial applications) and is growing more than 10% annually. The yearly market value of sales for industry only is estimated 2.2 billion (around 1100 systems). How a social cost-benefit analysis of the transition to new technologies should be designed? The main potential net socio-economic benefit is the difference between the cost trajectory of the current and future technologies. Other benefits may include incremental effects on human capital, technological spillovers, product and service innovations, cultural effects, as described in Florio and Sirtori (2016, in Technological Forecasting and Social Change). These concepts are captured quantitatively by the expected net present value (NPV) of such difference, over a suitable long-term intertemporal integration, given a social discount rate. Given the high uncertainty surrounding both the demand drivers, the cost savings, the additional benefits, several variables in a forecasting model should be treated as stochastic and the final result expressed as a conditional probability distribution of the NPV after a suitable Delphi assessment and Montecarlo.

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