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Transformation of the Global Energy System: Costs and Options

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An ambitious climate policy that does not hinder economic growth is possible. The estimated costs of climate protection depend critically on assumptions about the future development of technological progress. Economic models need to depict technological progress in a way that acknowledges at least the robust aspects of the process of innovation corresponding to the historical experience of market societies. In several models the cost of climate protection tends to be overestimated for three reasons. First, no consideration is given to the ability of entrepreneurs to react innovatively to signals about scarcity, e.g. by using fossil fuels more efficiently. Second, the cost-cutting potential of renewable energy sources are not taken into account appropriately. Third, the interplay between carbon capturing and sequestration (CCS) and the other relevant mitigation options is often omitted. With every new option, the economy becomes more flexible, and therefore it can react more cost-effectively to climate policy. It turns out that improving energy efficiency in using fossil fuels is not sufficient for achieving climate protection goals because of its relatively high macro-economic mitigation costs. This option has to be complemented by substitution of fossil-fuels with renewable energy sources and the use of CCS. These three options together endow market societies with enough flexibility in order to reduce the probability of dangerous interference of climate change at relatively low macro-economic mitigation costs.