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【2】The Transformation of the Energy System - Challenges and how to meet them

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The current energy system finds itself at the beginning of a transformation process of which until now only targets and fundamental determinants are known. To meet the strategic goal of a medium global warming of under 1.5-2 K, a drastic reduction of greenhouse gases until 2050 is necessary. The energy system in the long run will have to work without fossil hydrocarbons. Some industrial processes like production of iron and steel, cement and basic chemical products which are fundamentally dependent on hydrocarbons will meet additional challenges.
Most renewable energy sources are derived from solar radiation (solar thermal, photovoltaic, wind, biomass, partly also hydropower and wave energy) and are harvested on surfaces with limited energy density. Especially sustainably produced biomass as an energy carrier is sought after –and competes directly with the food supply, materials and ecological needs –meaning that under an overall perspective they are rather scarce.
Strongly increased efficiency technologies for the reduction of overall energy consumption are required in a first step.
The regional and temporal structure of energy use and energy production, especially electricity, will change and this in turn will call for transformations in the infrastructure as well as the relationships between actors (i.e. „prosumer“) and business models.
The transformation of the energy system is a complex task that interweaves technological as well as societal and economic requirements and developments.
Prognos AG has explored the necessary transformation processes in Germany and Switzerland in detailed energy system scenarios and presents the main results as well as open questions –especially ones with a physics context.

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