



DESERTEC and Beyond - Options of a Global Energy Transition

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The DESERTEC idea was originally developed as a concept for power production at large scale, making use of solar energy in the deserts of North Africa with the option to transport a significant fraction of power to Europe.

The DESERTEC idea has been generalized to a concept that is applicable worldwide. It is based on three main pillars: 1) Deserts of the world are important sources for strong and reliable solar radiation. 2) The oceans with their coastal areas are an important source of reliable and strong wind power. 3) A large-scale high voltage direct current (HVDC) power grid distributes the power among the centers of generation and consumption. It has to have a size of 1000 x 1000 km² or larger, so that the grid is able to average out a significant fraction of the natural fluctuations in the production and consumption of power. 4) DESERTEC includes the nexus between water and energy in deserts and follows ecological standards and the participation of the local population in the value creation chain.

In a renewable, sustainable world, the long- and short-term energy storage, the productions of gaseous and liquid fuels for mobile application and carbon as base material for the chemical industry have to be considered. The large areas of deserted and degraded soils can contribute on a global scale to bio-fuel production and black carbon sequestration without being in competition with food production.

There are two competing future options in the global energy market: the production of renewables using desert sun and arctic winds in combination with a world-wide overlay grid or alternatively almost autarkic local systems mainly based on PV and batteries. Similar as in the evolution of computer systems, where central mainframes were replaced by local personal computers and emphasis now goes back to powerful cloud systems, the power market may expect similar developments, possibly including fusion energy on the long run.

Keywords: DESERTEC; energy system; sequestration; deserts; solar fuel; overlay grid