

CLIMEWORKS – HOW TO FILTER CO₂ OUT OF AMBIENT AIR



Problem – Challenge

Extracting greenhouse gases from the atmosphere and thus mitigating climate change, remains one of the most important challenges of the 21st century. Burning fuels creates mainly CO₂ and H₂O. This reaction can be reversed with available industrial technology. Synthetic fuels can be produced from CO₂, water and electricity as the only inputs. By supplying atmospheric CO₂ and renewable energies for fuel synthesis, the resulting fuel is carbon-neutral and an efficient means of storing and transporting renewable energy.

The storage of renewable energy in synthetic fuels is an alternative to storing it by means of batteries or hydrogen. The transportation sector can be supplied with carbon-neutral fuels, while the existing hydrocarbon fuel infrastructure can be maintained.

Solution

A newly developed CO₂ adsorber technology from the ETH Zurich spin-off Climeworks AG is based upon a cyclical adsorption/desorption process with a new cellulose-based filter material, which was developed at the Swiss Laboratories for Materials Science and Technology (Empa) in collaboration with Climeworks and the ETH Zurich. The new material can adsorb CO₂ from humid air, store it, and then desorb it again as highly pure gas by heating the material to approximately 90° C, such as for technical use in the production of synthetic fuels. The adsorber can be used for a large number of adsorption/desorption cycles. Meanwhile, Climeworks is running a CO₂-adsorber pilot plant on industrial scale that is capable of extracting 50 tons of the gas per year. The collaboration with Empa on the up-scaling of the cellulose-based material is on-going.

