DECEPTIVELY REALISTIC

The biotech material from Modern Meadow looks like leather—but it isn't. The New Jersey–based US startup creates this vegan product from collagen produced by means of a fermentation process that uses yeast cells. In the future, the finished material could replace leather made of animal hides in products such as shoes and handbags. In the fall of 2019 Evonik's venture capital unit bought shares in Modern Meadow—thus helping to shape a future in which people can do without leather.

A LOOK AROUND THE WORLD

Innovations from science and research

Emissions catchers on wheels

Swiss researchers are aiming to reduce the climate impact of trucks—with a CO_2 storage unit on the roof

According to the European Environment Agency (EEA), trucks were responsible for about a fourth of the CO_2 emissions in road traffic in 2017. That's a considerable challenge for climate protection. But now researchers at the Swiss Federal Institute of Technology Lausanne (ETHL) have developed a concept that aims to drastically reduce truck emissions. The CO_2 is collected in the tailpipe of the truck and then cooled and liquefied—in a two-meter-long collection capsule on the roof of the vehicle. A key role in this process is played by oxygen and nitrogen, which help to separate the carbon dioxide from other gases. The collected CO_2 can be pumped off at special service stations and subsequently processed into synthetic fuels, for example. The ETHL researchers Shivom Sharma and François Maréchal aim to reduce total truck emissions by as much as 90 percent. The two scientists are now planning to develop a prototype.

PEOPLE & VISION

"Our findings could make ice removal child's play in the future"

THE MAN

Joseph S. Francisco, 64, grew up in Beaumont, Texas, near huge factories and petroleum refineries that discharged pollutants into the air. Early on in his career, he started to focus his research on the connection between air pollution and respiratory illnesses. That was the starting point for a decades-long career as an atmospheric chemist. Francisco has taught and conducted research at numerous universities in the USA, Europe, and Asia. Today he is a professor at the renowned University of Pennsylvania, where he is investigating previously unexamined chemical reactions in the Earth's atmosphere.

THE VISION

The team of scientists led by Francisco is studying the growth of ice. The team recently achieved a breakthrough: By using a visualization they were able to show what happens at the level of atomic structure when ice is formed in the atmosphere. This sounds abstract, but it could soon have practical consequences for the use of wind energy in the winter. That's because when wind turbines ice up, they often break down. The findings of the US researchers could help to make the de-icing process much faster and more economical—and thus give wind power an additional boost.

Bending, not breaking

Flexible airplane wings make flying more environmentally friendly

The aviation sector is a pioneer in the field of lightweight construction. In order to reduce kerosene consumption, aircraft manufacturers have for years been using materials that are lightweight yet stable, such as plastics reinforced with glass fiber or carbon fiber. The Institute of Aeroelasticity at the German Aerospace Center (DLR) is collaborating with Delft University of Technology to further decrease the weight of airplane wings. The researchers have built an aeroelastic airplane wing that is longer, lighter, and more elastic than conventional wings. Thanks to specially aligned carbon fibers, the wings can twist under high pressure so that strong gusts of wind do not generate any additional lift.

SOLAR TRANSITION

Researchers at Nanyang Technological University (NTU) in Singapore have developed a recycling method in which plastic waste is converted into valuable chemicals with the help of sunlight. The heavy metal vanadium acts as a chemical catalyst that promotes the disintegration of molecules of plastic under the influence of solar radiation. The result of this process is formic acid, which can be used, among other things, to generate electricity in fuel cells.

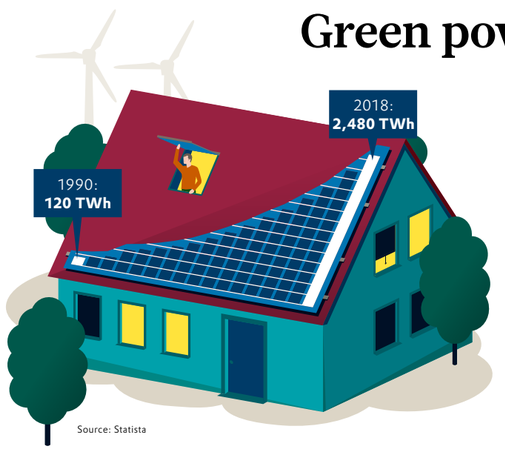
25

PERCENT

of the greenhouse gases that are currently emitted every year can be saved by 2050 through the use of innovative chemical technologies, according to a study of the International Council of Chemical Associations (ICCA). The biggest potential is offered by solar cells, amino acids for animal nutrition, and battery storage systems.

THAT'S BETTER

Green power



Source: Statista

In spite of all the obstacles and difficulties, the energy transition is a success story. Global consumption of renewable energy from the sun, wind, and water has been growing steadily at high rates of speed. In the past three decades, it has increased by a factor of more than 20. China is the front runner, outdoing the United States and Germany by a significant distance.

Worldwide consumption of renewable energies in terawatt hours (TWh)

GOOD QUESTION

"Professor Hu, will we soon be able to use wood to cool our homes?"

Yes, but not regular wood. By removing lignin from conventional wood and pressing it, my team and I have created a bleached "white wood," which has two benefits. On the one hand, it hardly heats up at all when it's exposed to the sun. On the other, it can radiate infrared energy into its surroundings. That's how the building is cooled down. The cooling effect is based on vibrations and the stretching of the cellulose molecules. As a result, the building does not require any additional cooling such as an air conditioning system. As we found out in our experiments, the building's energy consumption could thus be reduced by 20 to 60 percent. The material's long-term durability—up to 20 or 30 years outdoors—remains to be evaluated. But we are optimistic that for some special cooling applications, such as roofs in a dry environment, the wood could be used within a few years.

Liangbing Hu is a professor at the University of Maryland. Together with his team, he is working on new, innovative uses for wood.