Action on climate and energy



ETH spin-off Climeworks is a key player in the rapidly growing global market for the direct air capture process in which CO2 is filtered out of the atmosphere and stored in the ground. The image shows a plant in Hinwil.
© Climeworks / Julia Dunlop 16 December 2022

With ETH technology, the university wants to increase its impact on decarbonisation, energy security and environmental protection.

Climate change has long been a reality, and its effects are becoming increasingly tangible: we're seeing ever more cases of temperature records being broken and extreme weather events like droughts and floods. With its ratification of the 2015 Paris Climate Agreement, Switzerland joined efforts to limit global warming to 1.5 degrees by pledging to halve greenhouse gas emissions by 2030. But Switzerland is not on track. In addition to climate change, the country is facing two other related challenges that are also partly accentuated by recent geopolitical events: the energy shortage threat, and loss of biodiversity. Determined to act, ETH has launched a variety of projects and activities, including the creation of three new professorships at the Department of Mechanical and Process Engineering (D-MAVT).

Exploiting surfaces for the energy transition

Surfaces and interfaces of different materials are omnipresent both in nature and technology, and often determine a material's functionality. As modern technologies can be used to modify these surfaces down to the atomic scale – thereby regulating the transport of energy or mass – a new professorship at D-MAVT has been set up to explore the interplay between the surface structures and function of a material, and to develop technologies to manipulate these surfaces for specific purposes. A key example of practical application lies in the capture, use and storage of CO_2.

Fueling our societies by the sun

Solar energy is the key to a sustainable society. Therefore, efficient technologies and materials are urgently required for the conversion, storage and use of solar energy. This applies not only to electricity generation, but also to the development of solar fuels, metals, fertilizers, and even cement.

In view of the latter, huge progress is needed if global-scale production is to be realised on a cost-effective and sustainable basis. The department's new professorship in solar energy technology will develop new technologies – and consolidate the university's current leading position in the field.

Sustainable mechanical structures

Forming the basis for machines like aircraft or robots, mechanical structures are ubiquitous, be it in transport or construction, medicine or production. New developments – such as meta-materials – open up unprecedented opportunities for innovations, e.g. climate neutral aviation. D-MAVT's third new professorship will therefore concentrate on incorporating sustainability aspects into new mechanical structures from start to finish: from the design and manufacturing process, through to their use and recyclability.

Material-specific aspects, embedded multifunctionality and optimised manufacturing processes will all play a major role in reducing CO_2 emissions and resource consumption. Two other departments have expanded their research in the field of sustainability: a new sustainable materials and devices professorship in the Department of Materials will focus efforts on upgrading the sustainability of the materials themselves and their production.

Processes are to be improved with a focus on lower resource and energy consumption and strategies for reuse developed. Composite materials are a tough nut to crack when it comes to recycling: for this reason, a new professorship in circular materials for sustainable future infrastructure at the Department of Civil, Environmental and Geomatic Engineering will work on identifying suitable additive materials with a low environmental impact and high recyclability in order to boost the development of improved building materials and infrastructures.

Learn more



Switzerland's largest alpine solar plant on the Muttsee dam at 2500 metres.

© Axpo

https://ethz-foundation.ch/en/spotlight/uplift-12-action-on-climate-and-energy/

PDF exported on 11/01/2026 20:38
© 2026 ETH Zurich Foundation