Motivation
The Federal Council set the goal to reduce Swiss greenhouse gas emissions to net-zero by 2050. The Joint Activity Scenarios & Modelling (www.sccer-jasm.ch) generated scenarios based on the joint expertise of the eight SCCER.

JASM Modelling framework
Three full energy system models form the core of the JASM modelling framework. They solve the combined optimization problem of designing and operating an energy system (electricity, heat, mobility) throughout a typical year. Numerous sectoral models supply key elements, e.g. cost efficiency curves for buildings renovation or the impact of climate change on hydro power generation.

Drivers, inputs and scenarios
A proper scenario definition requires a multitude of inputs, such as the growth in population and GDP, the availability of resources (e.g. biomass), the costs of key technologies, etc. All assumptions have been harmonized and properly documented on the JASM website www.sccer-jasm.ch. A few examples are given to the right.

Key results
A number of common insights resulted from the different sectoral and full energy system models:
• The net-zero climate target cannot be reached without deploying CO$_2$ Capture and Storage (CCS) at a scale of at least 9 Mt/a. CO$_2$ needs to be captured on cement plants, waste incinerators, and as a byproduct of hydrogen production. If geological storage cannot be realized in Switzerland, a connection to a European transport and storage infrastructure is required.
• Heat pumps and electric vehicles are the dominating technologies in a net-zero world; electricity consumption increases to 80-90 TWh/a but this can be generated without compromising the net-zero CO$_2$ targets.
• Energy efficiency measures in buildings and industry are cost-effective to reduce CO$_2$ emissions.
• Hydrogen plays a significant role with a turnover of 10-20 TWh/a. It is produced by a mix of electrolysis, steam reforming and biomass gasification (both with CCS), and is used for freight transport and the generation of electricity and industrial heat.
• Photovoltaic is the dominant new renewable technology with an annual production of approx. 25 TWh/a. Overproduction in summer is balanced by batteries, pumped storage and power to heat / gas.