SCCER SoE

SWISS COMPETENCE CENTER for ENERGY RESEARCH
SUPPLY of ELECTRICITY

Innovative and Sustainable Research in the Areas of Geo-Energy and Hydropower

In cooperation with the CTI

Energy funding programme
Swiss Competence Centers for Energy Research

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

## In Brief

The aim of the Swiss Competence Center for Energy Research – Supply of Electricity (SCCER-SoE) is to carry out innovative and sustainable research in the areas of geo-energy and hydropower.

The SCCER-SoE researches, develops, and tests new technologies and optimizes existing infrastructures for energy production in the future. Working in close cooperation with the industry, the SCCER-SoE creates innovative research units, establishes technology platforms, invests in laboratories, and coordinates national as well as international research projects. These are financed by a number of different sources.

As a national network, the SCCER-SoE brings together expertise from 25 Swiss scientific institutions, industrial enterprises, and federal agencies. Its activities are undertaken in coordination with the Swiss Federal Office of Energy. The SCCER-SoE is financed by the Swiss National Science Foundation and the Commission for Technology and Innovation. The latter is also responsible for the supervision of the SCCER-SoE.

SCCER SoE

## Background

In 2013, the Federal Council and the Parliament decided upon the Energy Strategy 2050 as their long-term energy policy. At its core is a step-by-step withdrawal from the use of nuclear energy. Switzerland is therefore required to provide forty percent of its domestically produced electricity from renewable energy sources. The SCCER-SoE is one of the measures that have been put in place to achieve this goal by 2050. It focuses on electricity that can either be produced flexibly or continuously to meet base-load demand.

## Mission

The SCCER-SoE is compiling answers to the following questions:

- Is it possible to generate five to ten percent of Switzerland's electricity supply securely and at a competitive price through deep geothermal energy?
- Is $CO_2$ storage a viable method of producing electricity from fossil fuels in a near-carbon-neutral way?
- How and at what price can hydroelectric power plant productivity be raised by ten percent while also increasing flexibility and maintaining the necessary infrastructure over the long term?

The focus is not only on technical developments, but also on the associated socioeconomic aspects and any effects on the environment.

## Timescale

During the implementation phase from 2013 to 2016, the SCCER-SoE establishes the necessary structures, research groups, and professorships, and launches the first research and development projects. During the second phase until 2020, important pilot projects will be implemented. This will facilitate the development and refinement of new technologies in order to meet the targets of the Energy Strategy 2050 both on time and in full.

## Research Partners

ETH zürich
Università della Svizzera italiana
WSL
Lucerne University of Applied Sciences and Arts – HOCHSCHULE LUZERN
UNIVERSITÉ DE NEUCHÂTEL
PAUL SCHERRER INSTITUT PSI
UNIL | Université de Lausanne
eawag aquatic research
ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE
UNIVERSITÉ DE GENÈVE
HSR HOCHSCHULE FÜR TECHNIK RAPPERSWIL – FHO Fachhochschule Ostschweiz
UNIVERSITÄT BERN
Schweizerische Eidgenossenschaft – Federal Office of Topography swisstopo
UNI BASEL
Hes·so VALAIS WALLIS

## Industry Partners

axpo
BKW
nagra
GEO ENERGIE SUISSE
SULZER
ALPIQ
sarmap
KWO GRIMSELSTROM
groupe E
Power Vision Engineering
FMV
esr énergies sion région
hydrique.
SIG

www.sccer-soe.ch

## Geo-Energy

Within the geo-energy sector, the SCCER-SoE is concerned with deep geothermal energy and $CO_2$ storage. Areas of focus include establishing a fundamental understanding of the physical processes involved in the creation of deep geothermal reservoirs and of the interactions between circulating water and the surrounding rock. An additional aim is to increase the efficiency of heat extraction from hot rock at a depth of several kilometers.

One of the core elements is the “In-situ Stimulation and Circulation” project. Experiments in the Grimsel rock laboratory at a depth of 450 meters allow an extraordinary insight into the crystalline subsoil using high-definition three-dimensional data. In addition, a pilot and demonstration project is in preparation.

## Hydropower

For the SCCER-SoE, some of the most important issues concerning hydropower are: forecasting quantities of water while allowing for climate change, the potential of glacial lakes that may develop in the future, optimal sediment management, and production flexibility in hydropower plants.

Environmental and socioeconomic conditions are also taken into account. The aim is to keep negative effects on the environment to a minimum. Furthermore, the effects of current and future market and political conditions need to be better understood.

## Innovative Technologies

In order to develop new and optimize existing technology, the SCCER-SoE relies on close cooperation with a variety of partners in the geothermal energy and hydropower sectors.

Regarding geothermal energy, innovations relating to borehole technology, borehole reinforcement, borehole sensors, and the development of corrosion-resistant materials are of particular interest. As for hydropower, the focus is on the optimization and expansion of the hydraulic machinery operating ranges (for example their partial load performance, erosion sensitivity, and operational demands), as well as the development of new technology for small-scale hydropower.

## Integrative Activities

The SCCER-SoE considers a complete picture of Switzerland’s energy supply within the context of three integrative activities.

In the “Global Observatory”, all relevant electricity production technologies are evaluated and compared as regards their potential, cost, and environmental impact. Energy-economy models are also used to analyze electricity scenarios both on a national and global level.

The “Risk Team” assigns high priority to the issues of risk, safety, and social acceptability. For instance, they aim to minimize the risk from induced earthquakes in order to ensure that threshold values are not exceeded and damage is avoided.

The “Center for Modeling and Simulation” creates new methods and user-friendly software for the virtual development, testing, and optimization of Swiss hydropower and geothermal plants.