NRP 70 Electricity supply

Joint project: Hydropower and geo-energy

Overview

Vision

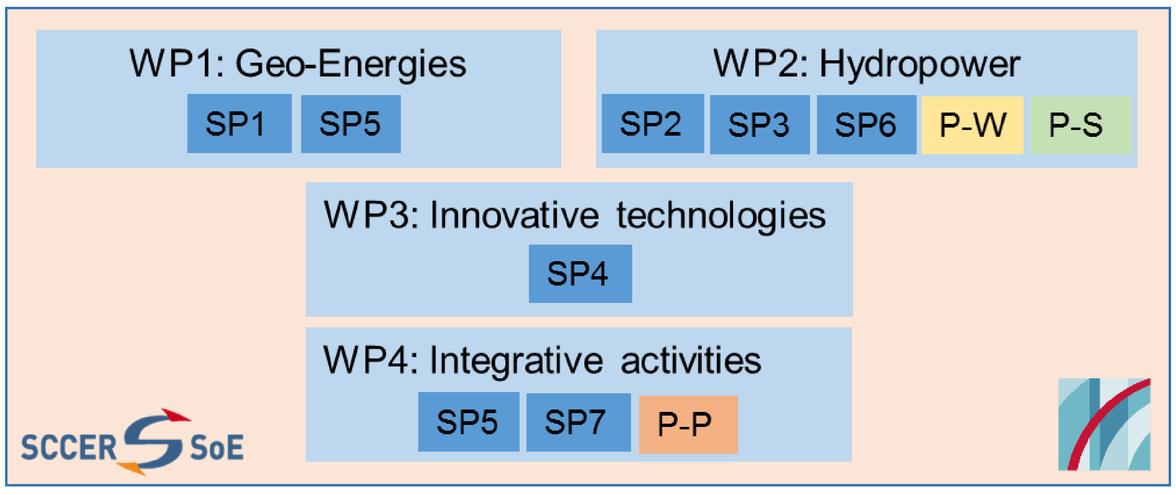
In 2050, the national demand of electricity of CH will be largely covered by renewable Swiss sources of band and stochastic electricity, including a higher component of hydropower (10%) and a significant component (7%) of deep geothermal energy, safely and at competitive costs.

Context

The joint project 'Supply of Electricity – HydroPower and Geo-Energy' (SoE-HPGE) covers the key sources of renewable band-electricity identified in the Aktionsplan "Koordinierte Energieforschung Schweiz" for the Energy Strategy 2050.

Connection between NRP 70 and SCCER-SoE

SoE-HPGE and its 7 sub-projects will support fundamental research in coordination with the Work-Packages of the Swiss Competence Center for Energy Research – Supply of Electricity (SCCER-SoE).



Related NFP 70 projects

- P-W Future of Swiss HP: An integrated economic assessment of changes, threats and solutions (Weigt)
- P-S Hydro-ecology and floodplain sustainability in application (Schleiss)
- P-P Trade-offs in switching from nuclear electricity to renewables in Switzerland (Patt)

Objectives

The integrated objectives of the seven sub-projects SoE-HPGE cover fundamental scientific targest:

- For deep geothermal energy, SoE-HPGE will focus on understanding processes for deep heat mining and CO_2 circulation, as well as on permeability and stimulation processes at high temperature and pressure conditions and will demonstrate their implementation in a rock laboratory and in a pilot plant.
- For hydropower, SoE-HPGE will focus on operations and infrastructures, considering erosion, sediment, changes to the periglacial environment, varying operating conditions and future requirements for large and small HPP.
- SoE-HPGE will develop the principles for a comprehensive risk governance for hydropower and geo-energy, covering both the supply and the demand side.

Main partners:

Research Partners: ETH zürich, Università della Svizzera italiana, Schweizerische Eidgenossenschaft Confédération suisse Confederazione Svizzera Confederaziun svizra – Federal Department of Home Affairs FDHA – Federal Office of Meteorology and Climatology MeteoSwiss, EPFL École polytechnique fédérale de Lausanne, eawag aquatic research, WSL, PAUL SCHERRER INSTITUT PSI, UNIL Université de Lausanne, UNIVERSITÄT BERN, unine Université de Neuchâtel, Schweizerische Eidgenossenschaft Confédération suisse Confederazione Svizzera Confederaziun svizra – Swiss Confederation – Federal Office of Topography swisstopo www.swisstopo.ch, UNIVERSITÉ DE GENÈVE

Industry Partners: ALPIQ, KWO Grimselstrom, Elettricità Svizzera Italiana ESI, fima, e-dric.ch

Subprojects

Seven independent, linked projects will develop a first block of fundamental research targets:

- SP1 Exploration and characterization of deep underground reservoirs (Diamond, Herwegh, Holliger, Burg)
- SP2 Extended-range hydrometeorological ensemble predictions for improved hydropower operations and revenues (Zappa, Liniger, Spirig, Jordan)
- SP3 Potential for future hydropower plants in Switzerland: a systematic analysis in the periglacial environment (Boes, Funk)
- SP4 Adequate sediment handling at high-head hydropower plants to increase scheme efficiency (Boes)
- SP5 Modelling permeability and stimulation for deep heat mining (Driesner, Krause, Miller)
- SP6 Optimizing environmental flow releases under future HP operation (Burlando, Molnar, Robinson, Lane, Perona)
- SP7 Risk governance of deep geothermal and hydro energy (Wiemer, Stauffacher, Lehning, Burgherr, Stojadinovic, Giardini)

Energy Turnaround

Contribution to the realisation of "Energy Strategy 2050"

The joint project will set out to answer fundamental questions and seek applicable solutions to secure increased availability of band-electricity by 2050, as foreseen in the Energy Strategy 2050:

- Can we extract safely the deep geothermal heat and produce at competitive costs a substantial portion of the national electricity supply, covering up to 5-10% of the national baseload supply?
- Is the geological capture of CO_2 a viable measure to enable carbon-free generation of electricity from hydrocarbon resources?
- Can we increase (i.e. by 10%) the present hydropower electricity production under changing demand, climate and operation conditions?
- Can we maintain, improve and operate the hydropower infrastructure in the long-term future?

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SCCER SoE – SWISS COMPETENCE CENTER for ENERGY RESEARCH – SUPPLY of ELECTRICITY

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