



Koordination der Forschungsinhalte im Überblick

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Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Content

1. Structuring effect of the SCCER program
 - ✓ Capacity building
 - ✓ Networking
 - ✓ National integration
 - ✓ Big science
 - ✓ International stature
2. Innovation Roadmaps
3. One example: from field to laboratory to deep underground validation to industry success

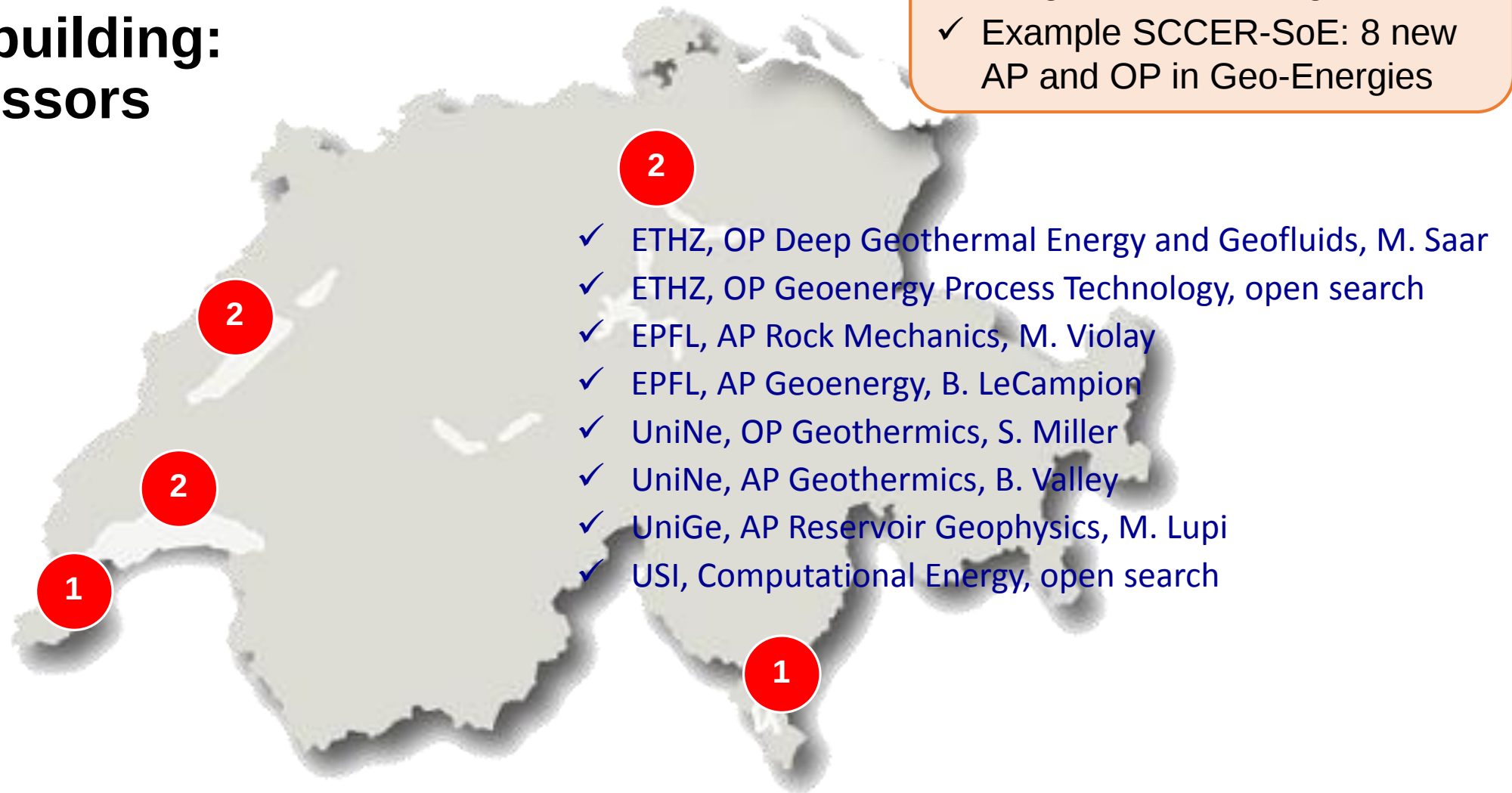


Swiss Competence Center for Energy Research
Efficient Technologies and Systems for Mobility

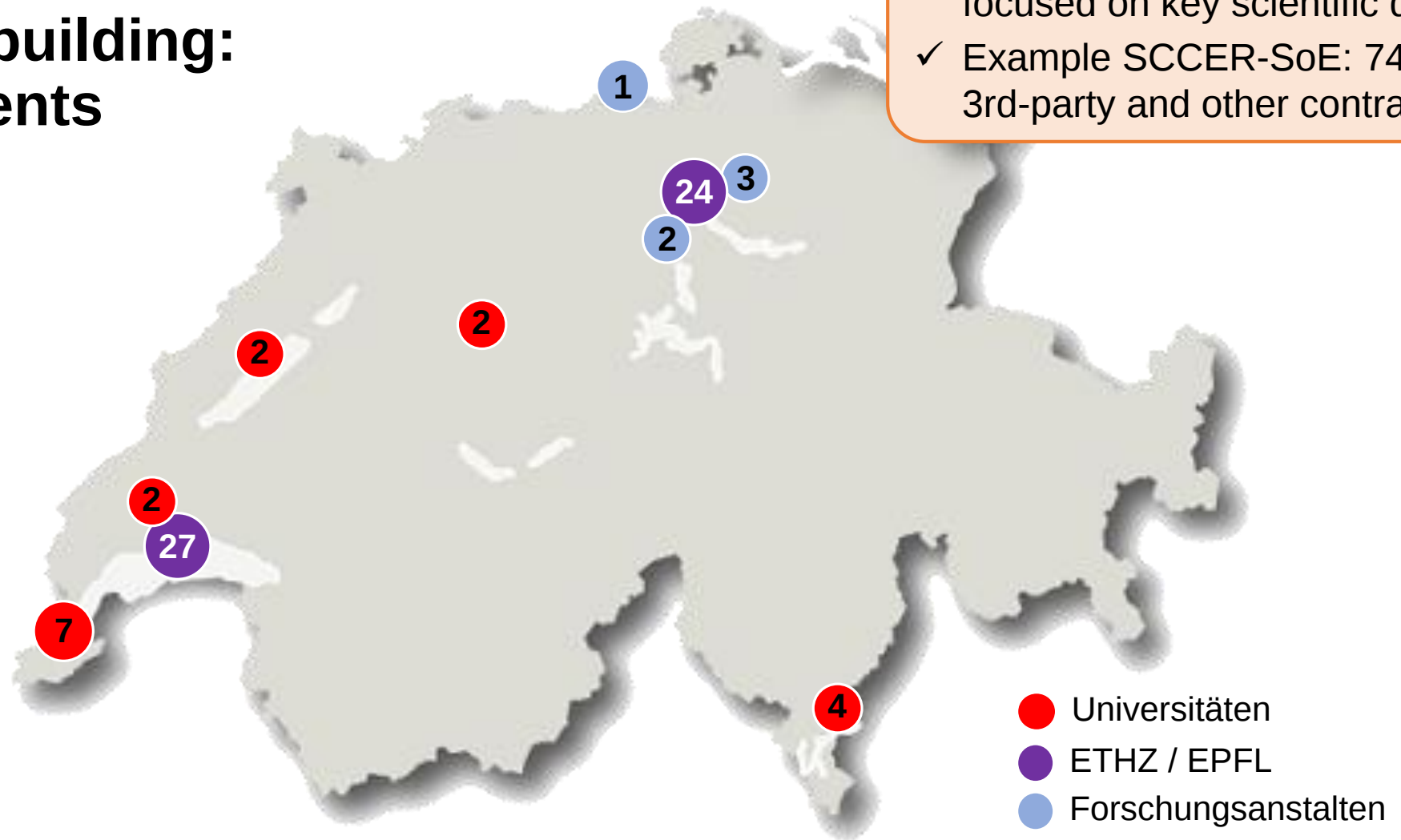


Capacity building: new professors

- ✓ An unprecedented growth
- ✓ Long-term structuring effect
- ✓ Example SCCER-SoE: 8 new AP and OP in Geo-Energies

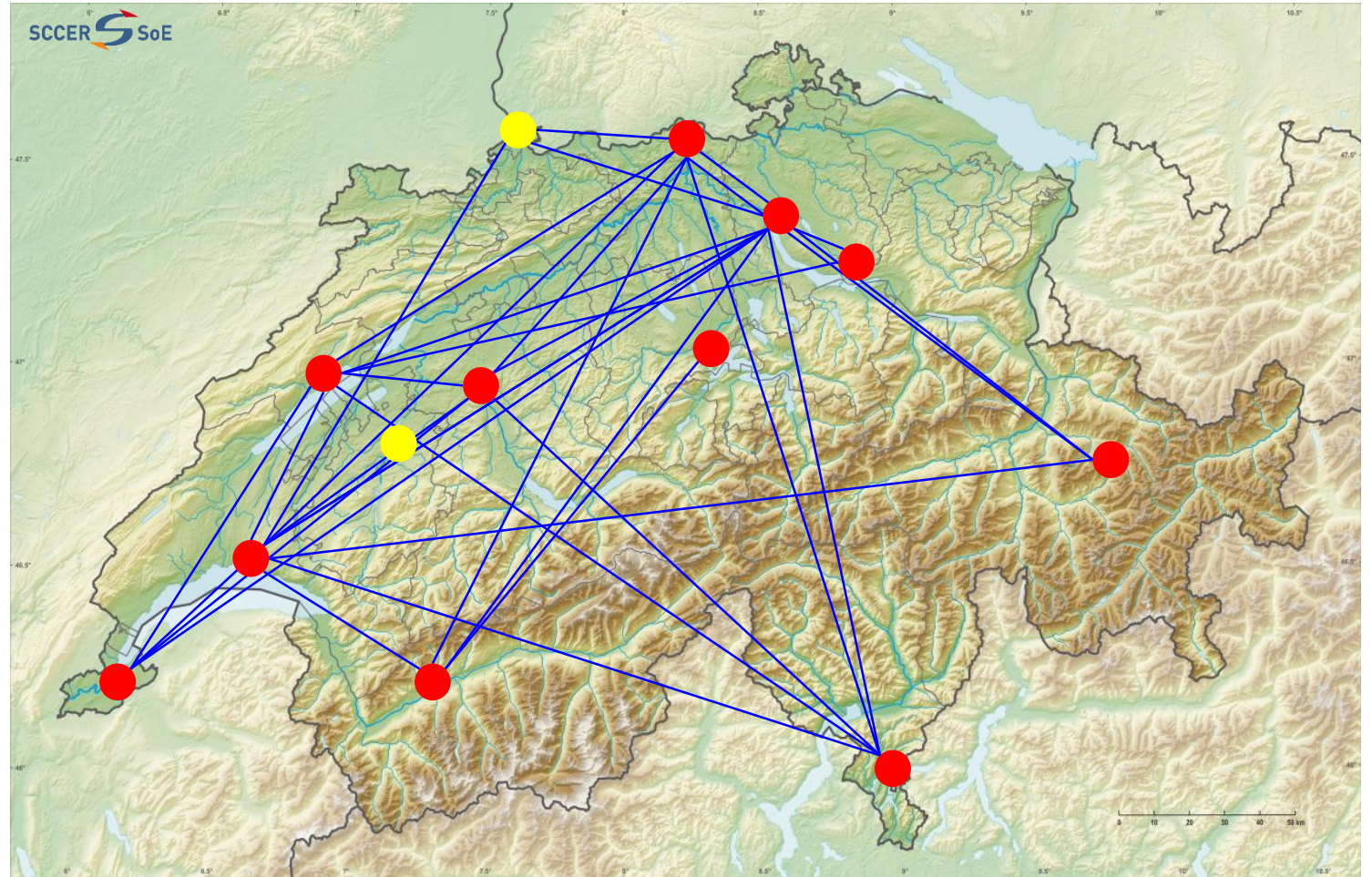


Capacity building: PhD students

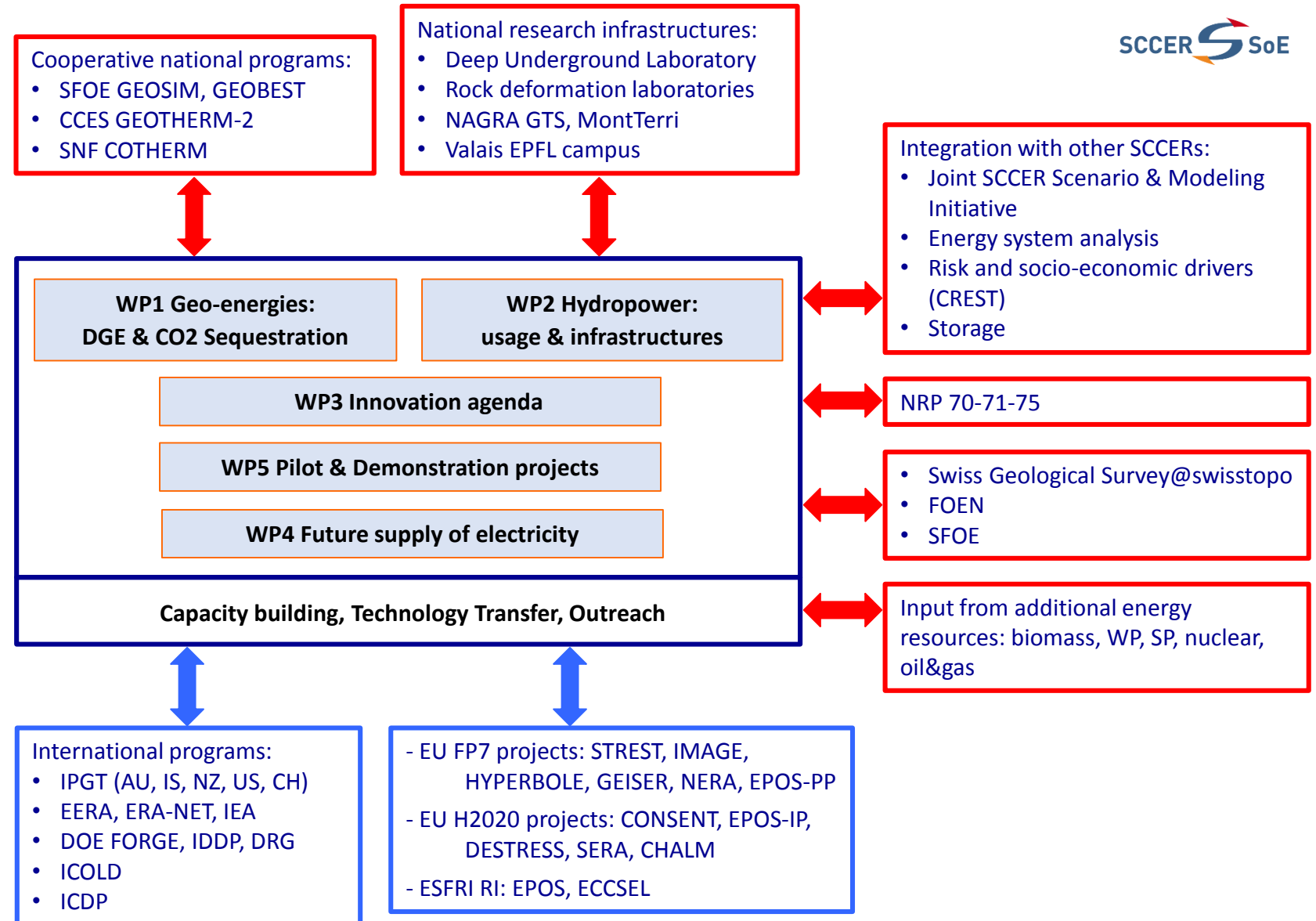


Networking

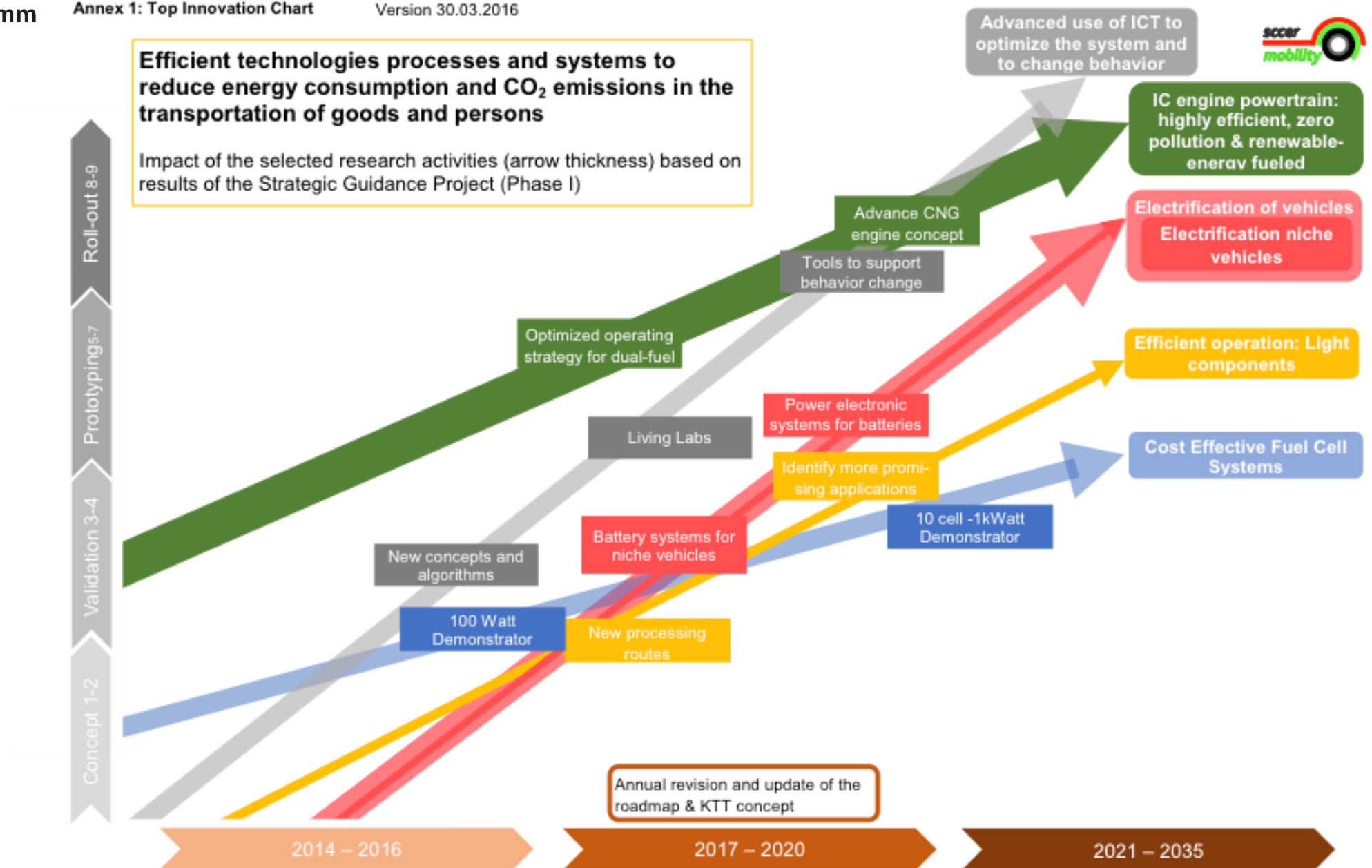
Switzerland has a competitive and well funded research environment, but no other program can bring together the networking required to tackle the ES2050 challenges



National integration



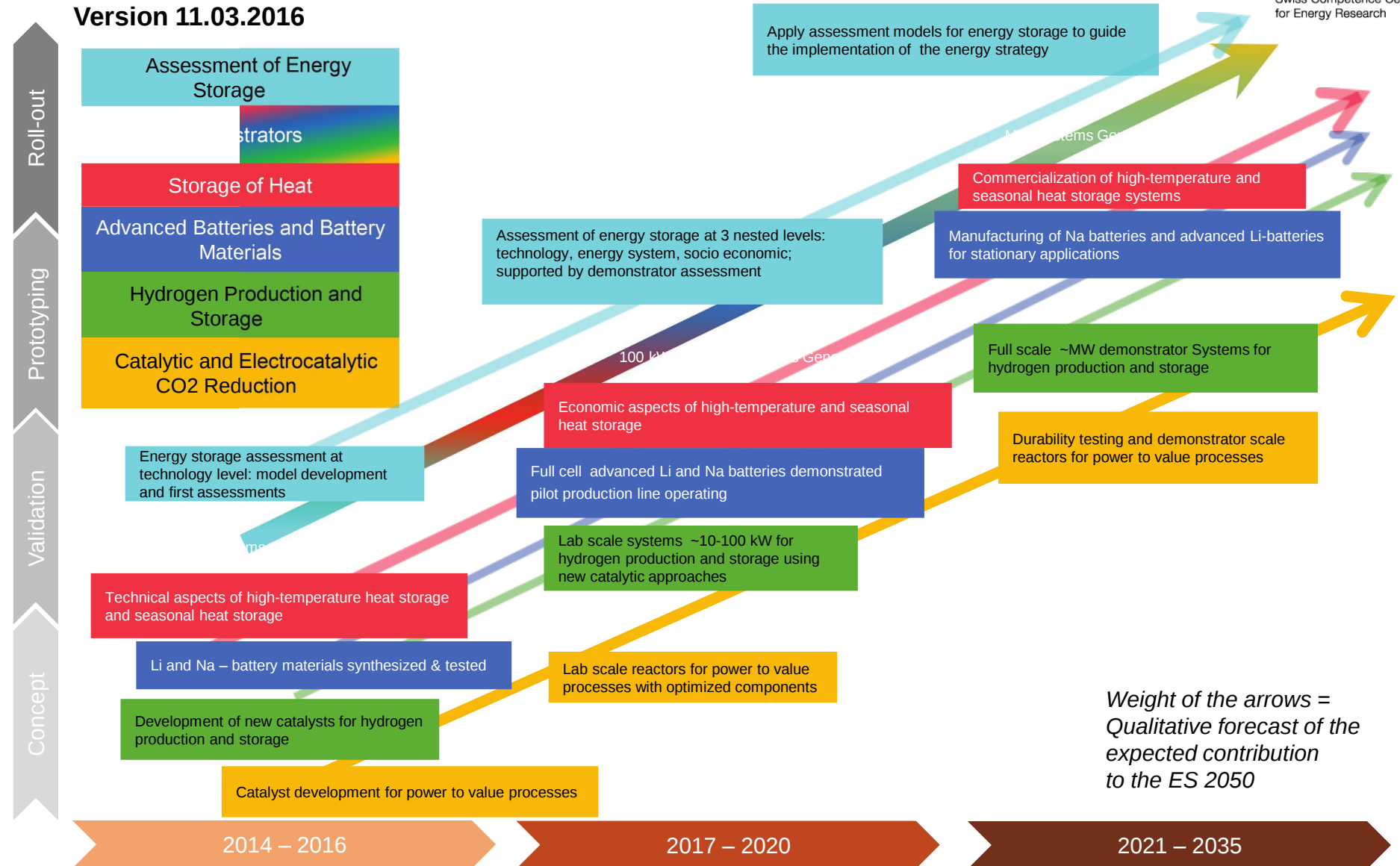
Innovation Roadmaps



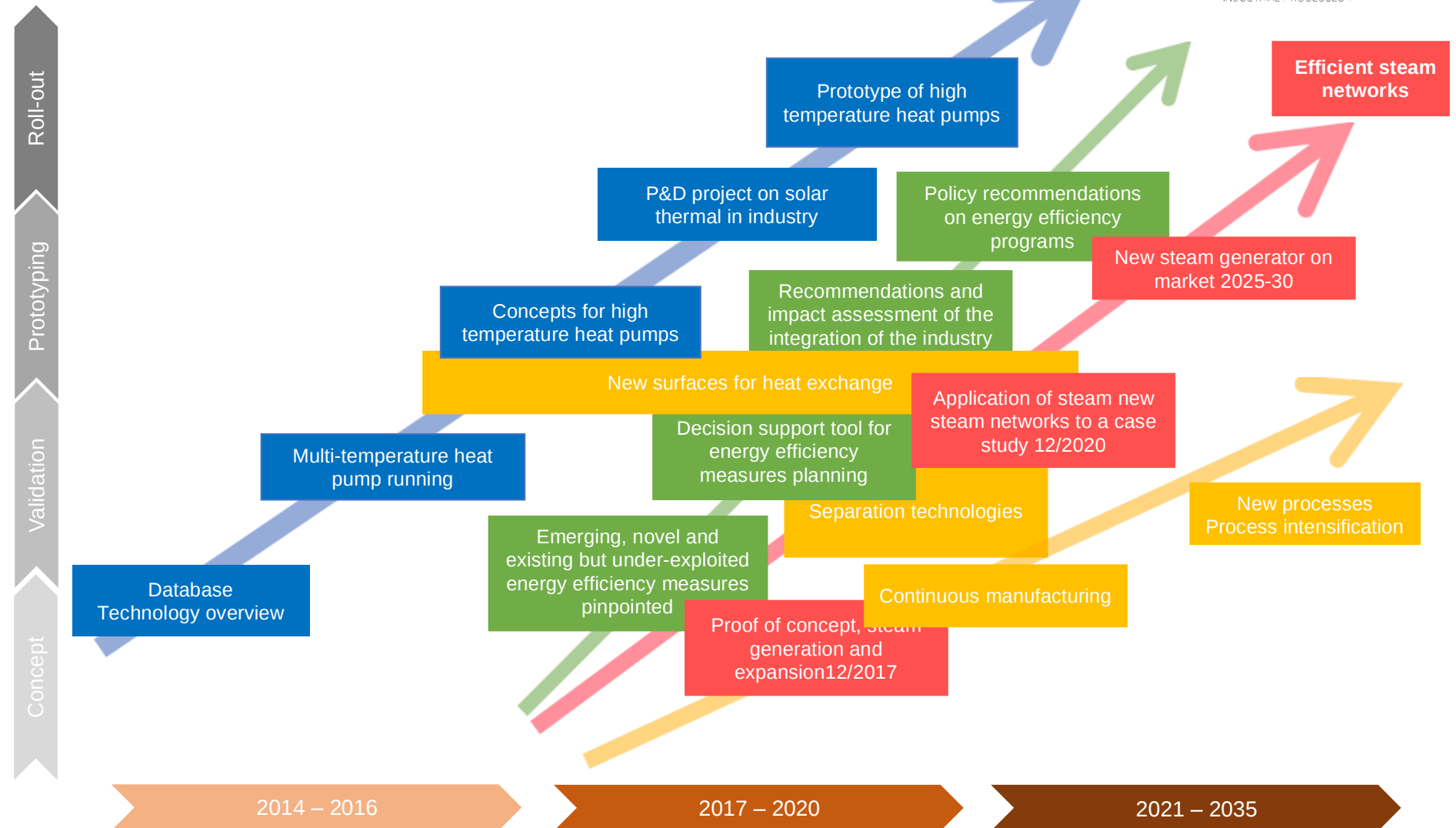
Goal/Vision of the SCCER Heat and Electricity Storage

Version 11.03.2016

Innovation Roadmaps

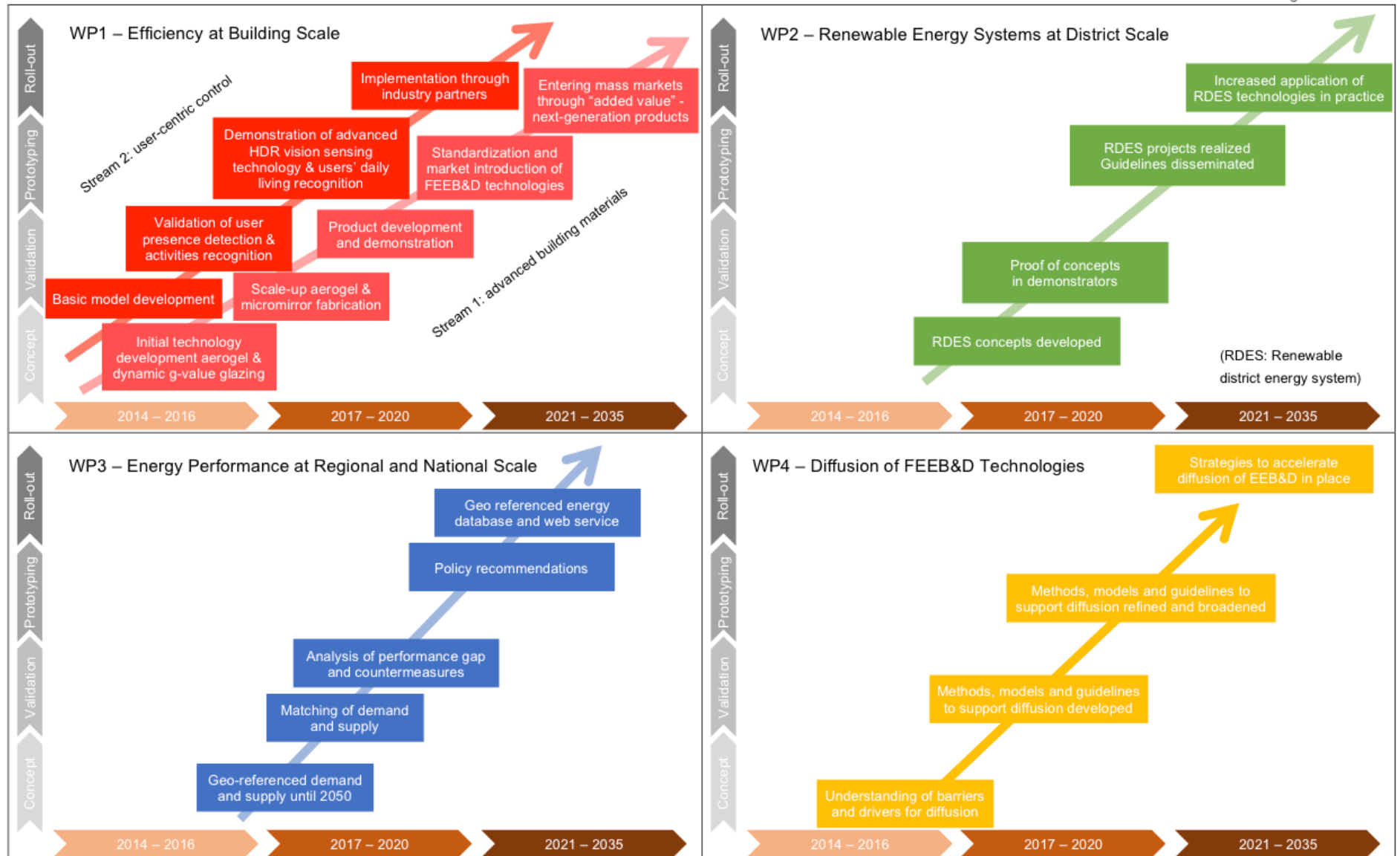


Innovation Roadmaps



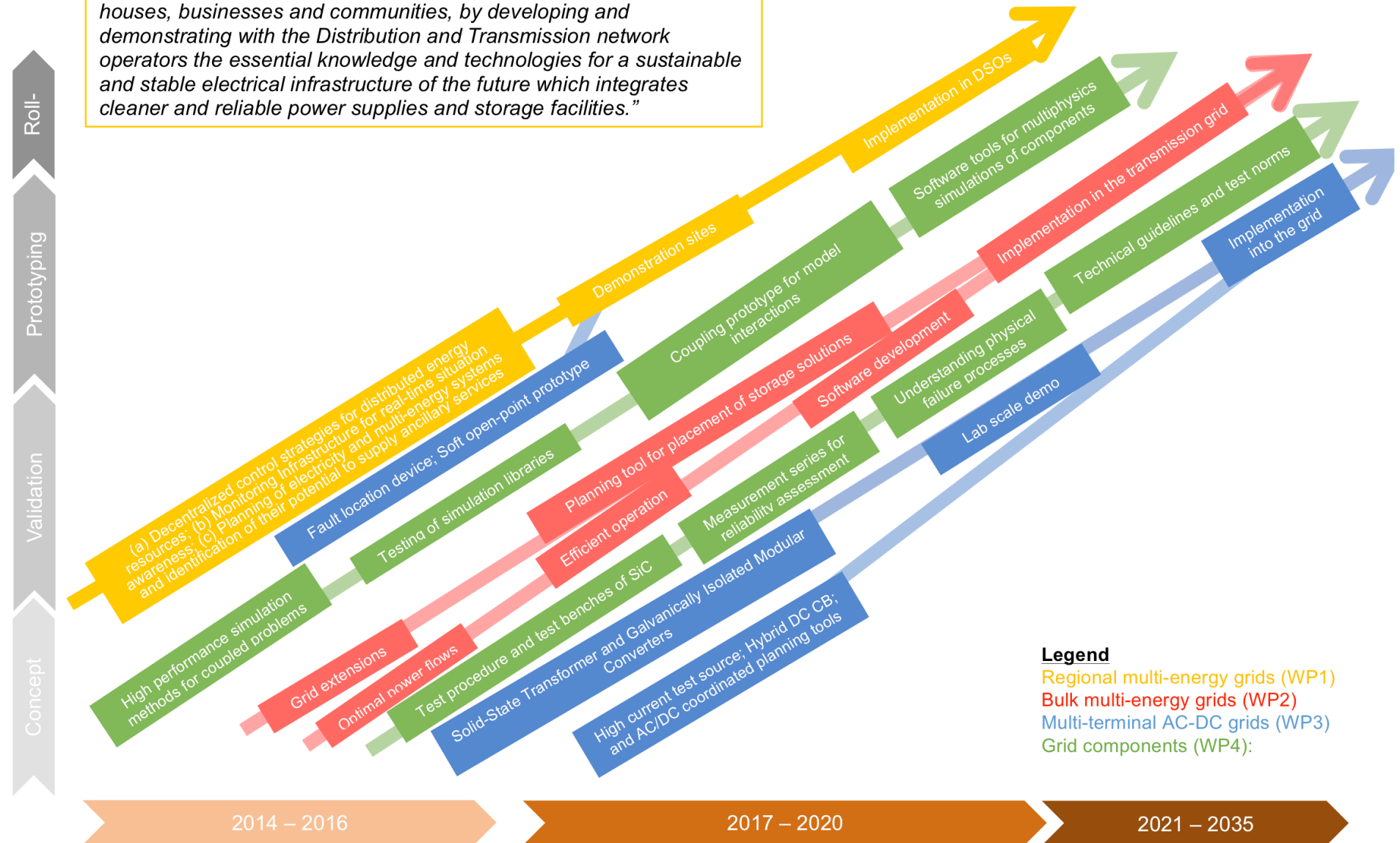
Innovation Roadmaps

The vision of the SCCER FEEB&D is the reduction of the energy demand of the Swiss buildings stock by a factor of 3 until 2035.



Innovation Roadmaps

Goal/Vision of the SCCER: “The SCCER-FURIES envisions the enabling of seamless and sustainable powering of Swiss citizens’ houses, businesses and communities, by developing and demonstrating with the Distribution and Transmission network operators the essential knowledge and technologies for a sustainable and stable electrical infrastructure of the future which integrates cleaner and reliable power supplies and storage facilities.”

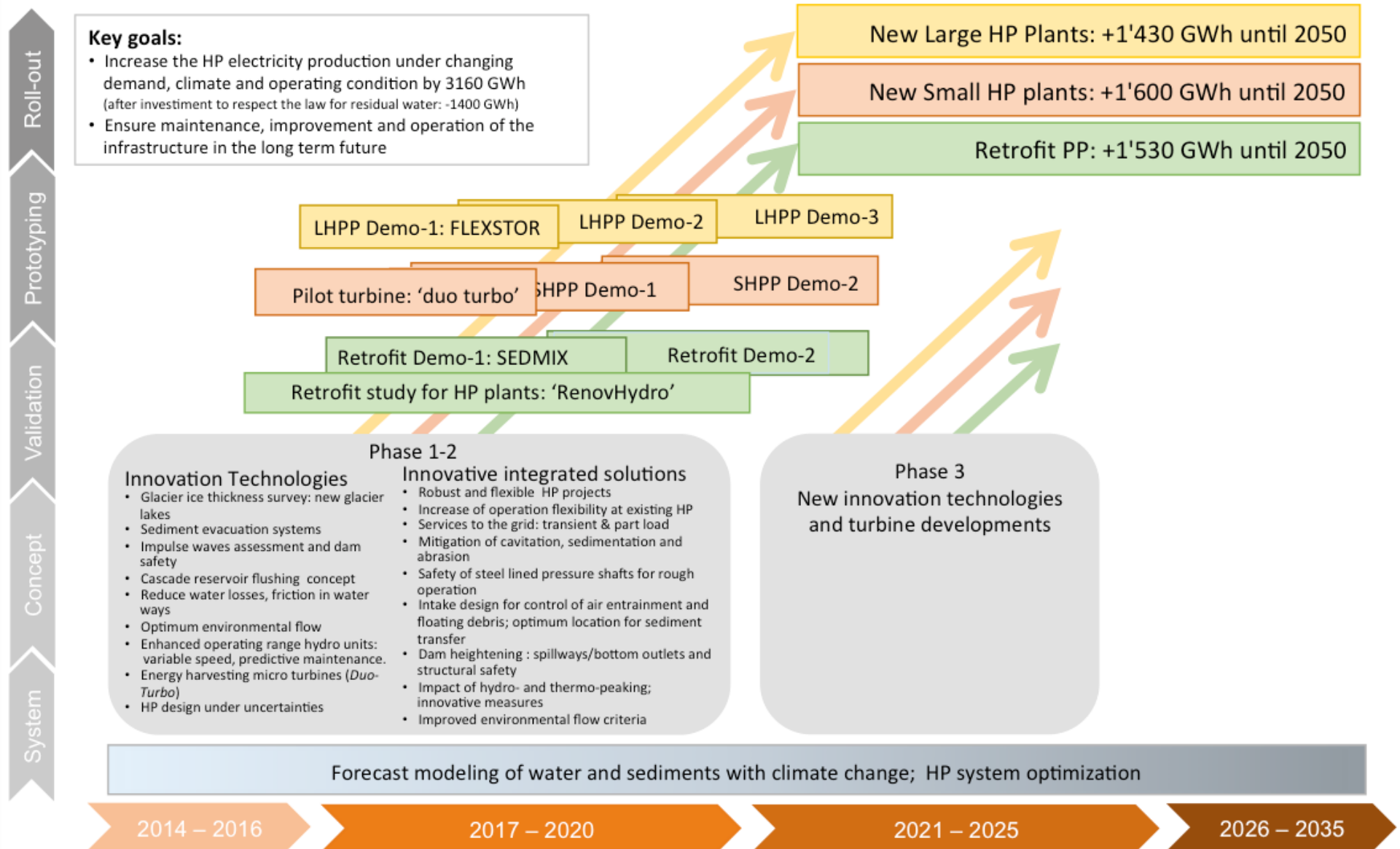


Innovation Roadmaps

Activity Overview of Hydropower

Key goals:

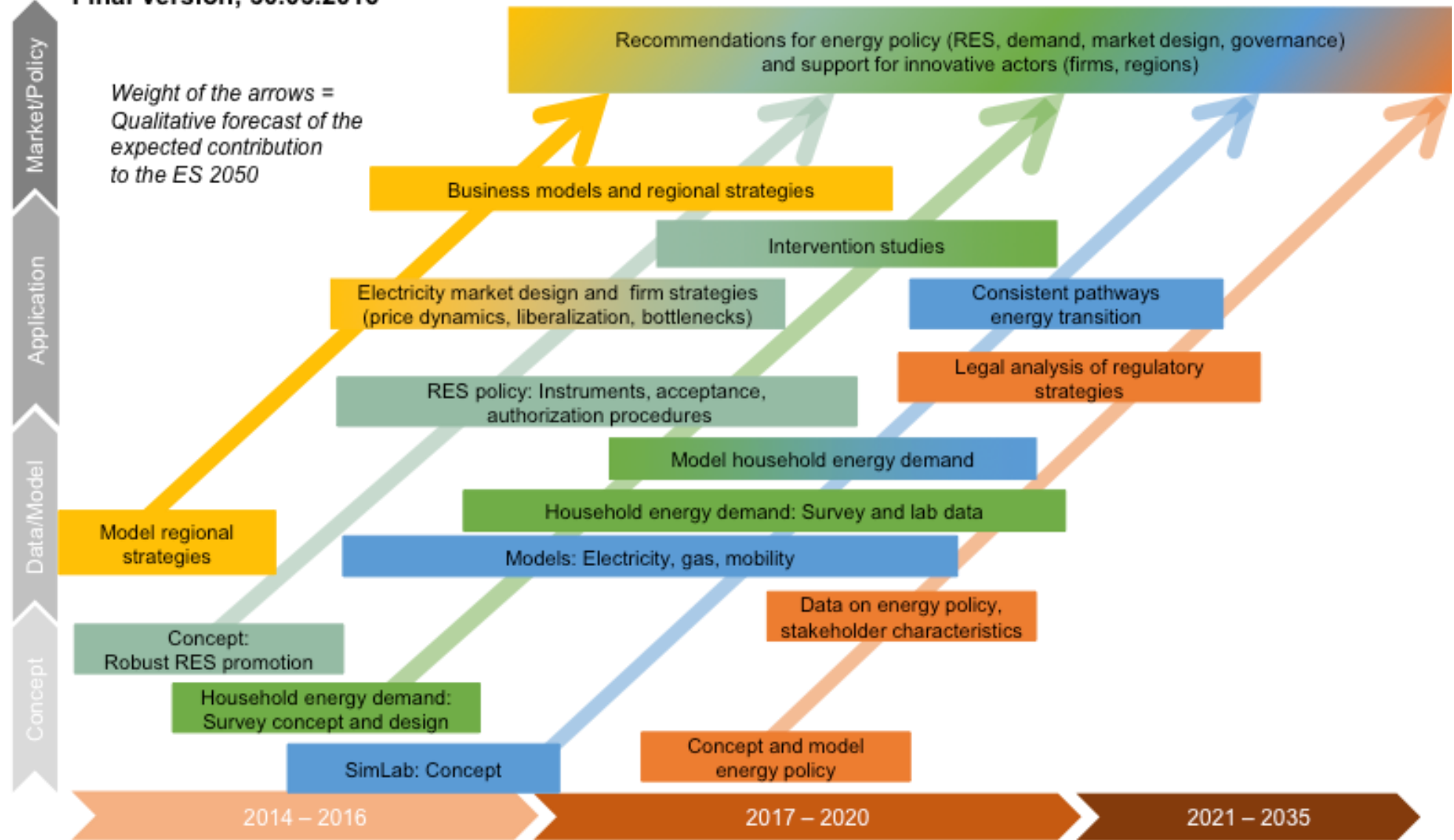
- Increase the HP electricity production under changing demand, climate and operating condition by 3160 GWh (after investment to respect the law for residual water: -1400 GWh)
- Ensure maintenance, improvement and operation of the infrastructure in the long term future



Goal/Vision of the SCCER CREST:

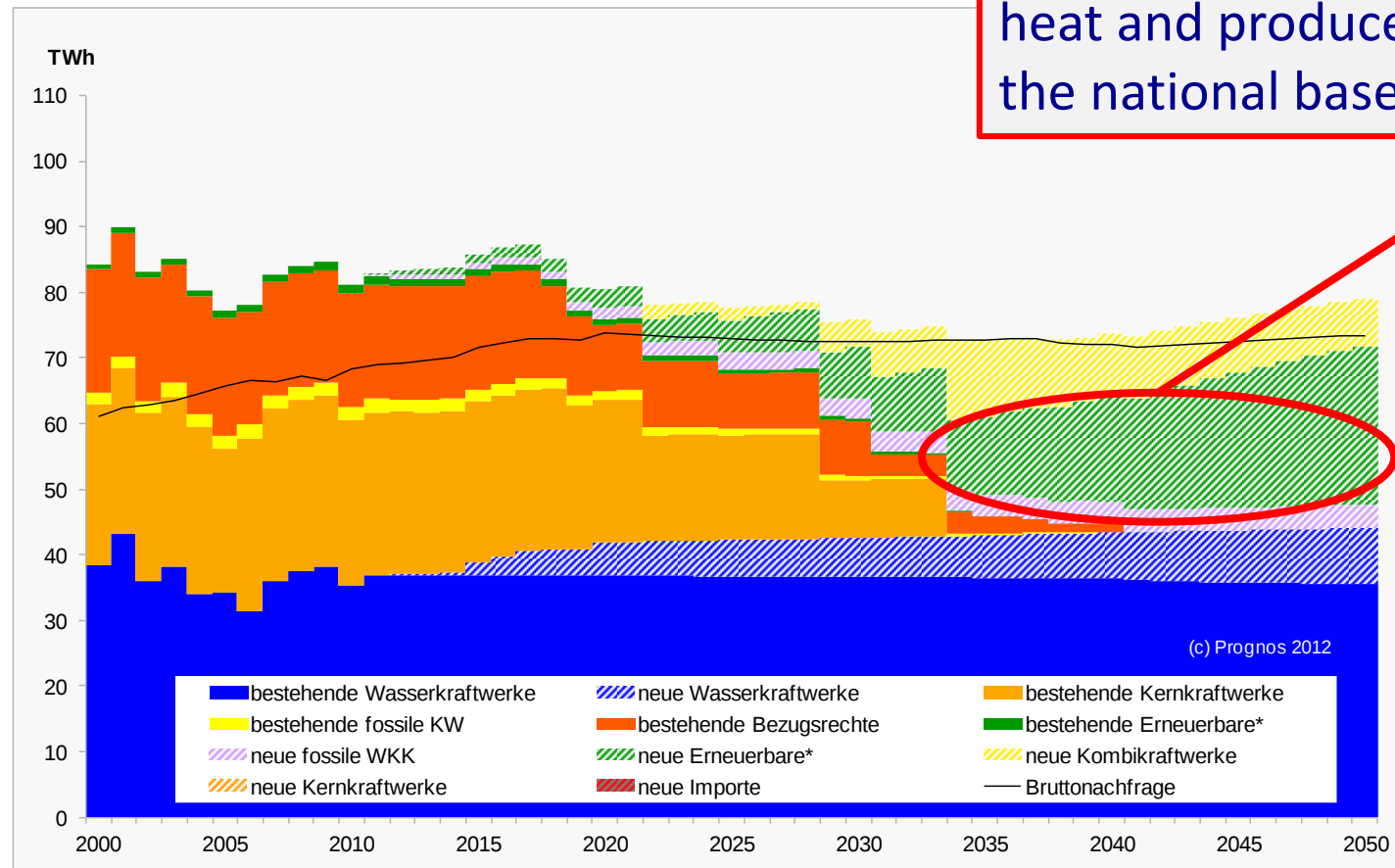
Final Version; 30.03.2016

Innovation Roadmaps



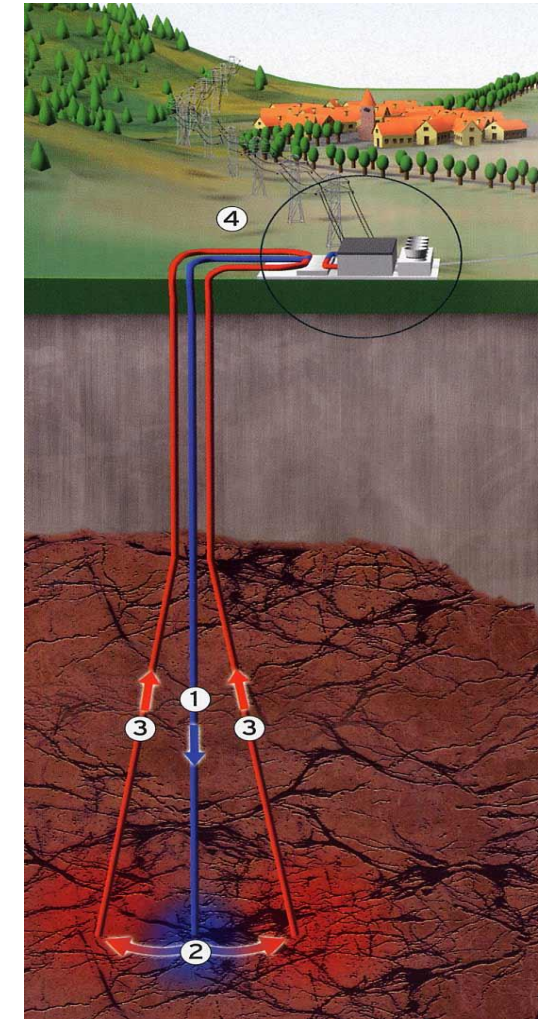
ES2050 target for Deep Geothermal Energy

Can we extract safely the deep geothermal heat and produce at competitive costs 7% of the national baseload supply ?



Challenge: engineering the deep reservoir

- ✓ In Switzerland we normally find 170-190° C temperatures at 4-6 km depth
 - ✓ Water at these depths is scarce and not easily found → hydrothermal energy has good potential for heating, less so for electricity
 - ✓ We need to create deep reservoirs in hot rock (EGS) and circulate water from the surface (petrothermal energy)
-
- ✓ The Swiss ES2050 target for DGE is 7% of Swiss electricity supply
→ 4.4 TWh/yr, at least 500 MWe installed
 - Switzerland will need to install 20MWe per year from 2025 to 2050 to meet the ES2050 7% quota
-
- ✓ A sustained water flow of 220 l/s at 180° C is required to generate 20 MWe
 - ✓ The main challenge is to create sustainable heat exchangers at depth, systems that will operate for 20-40 years with minimal temperature loss



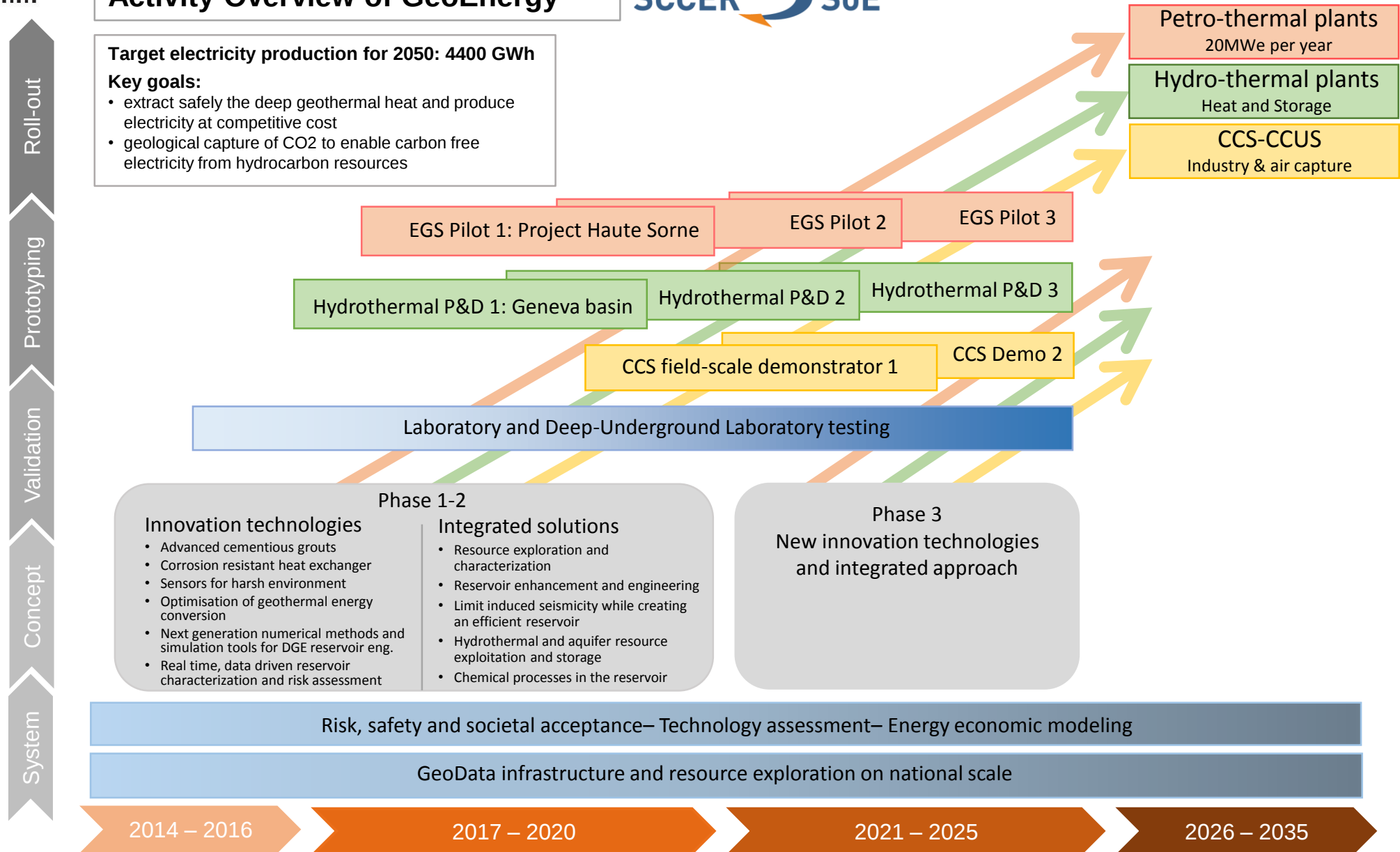
Deep Geothermal Energy Roadmap

Activity Overview of GeoEnergy

Target electricity production for 2050: 4400 GWh

Key goals:

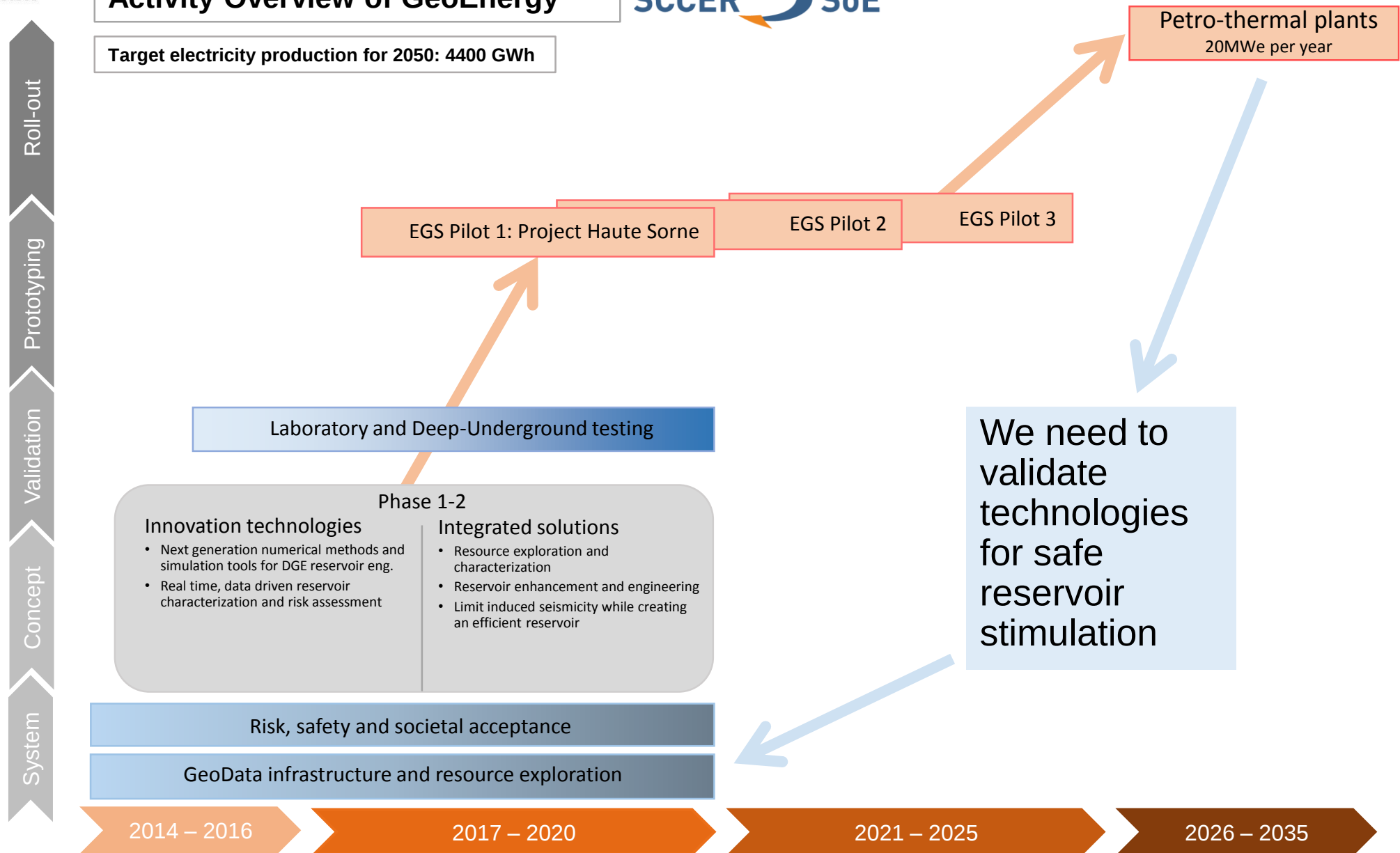
- extract safely the deep geothermal heat and produce electricity at competitive cost
- geological capture of CO₂ to enable carbon free electricity from hydrocarbon resources



Deep Geothermal Energy Roadmap

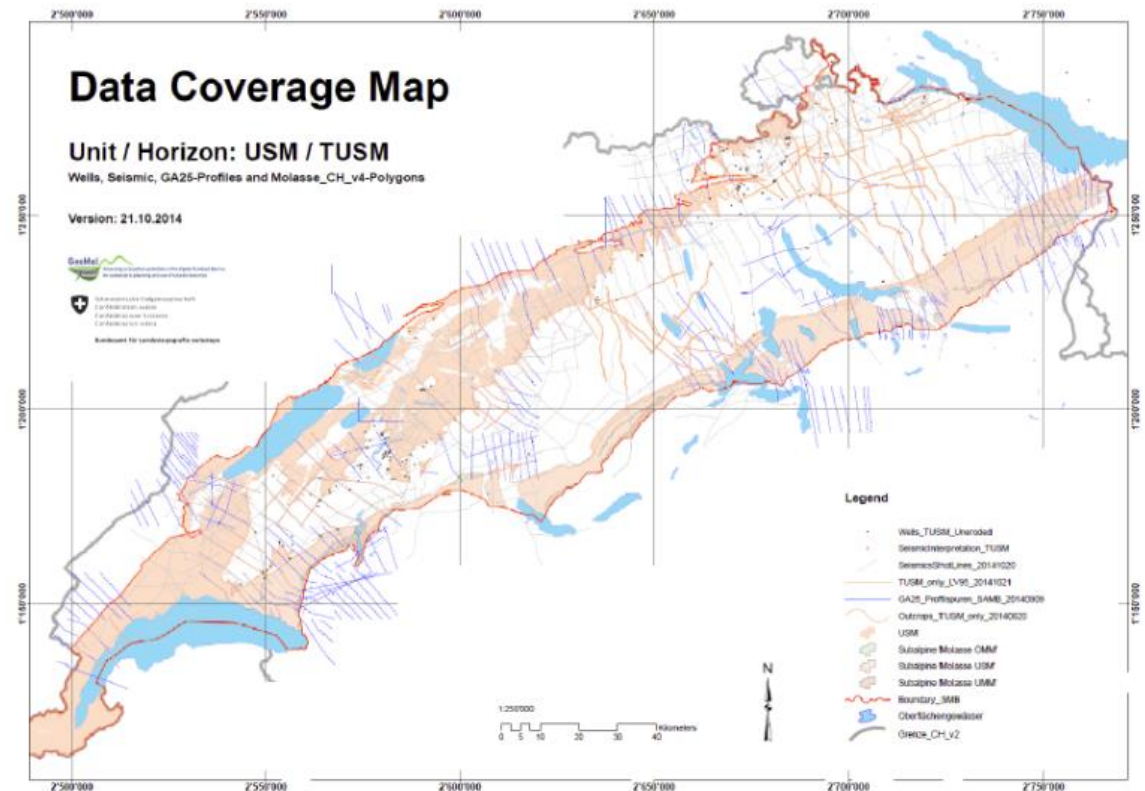
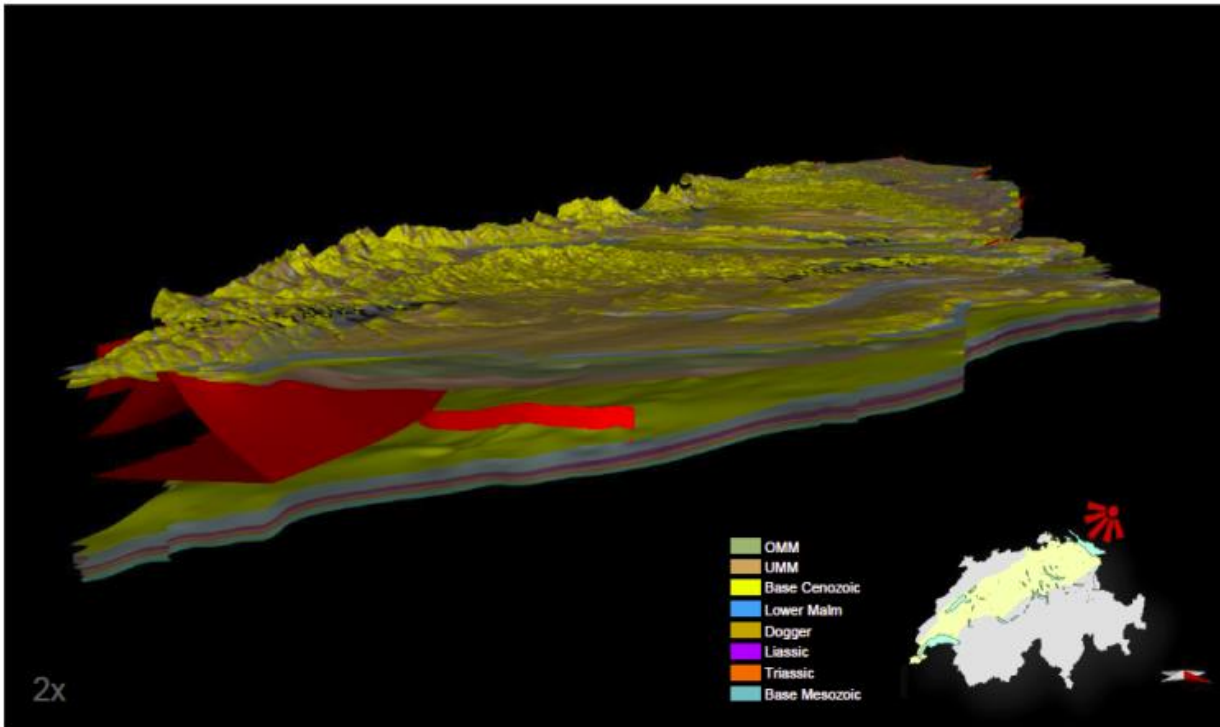
Activity Overview of GeoEnergy

Target electricity production for 2050: 4400 GWh

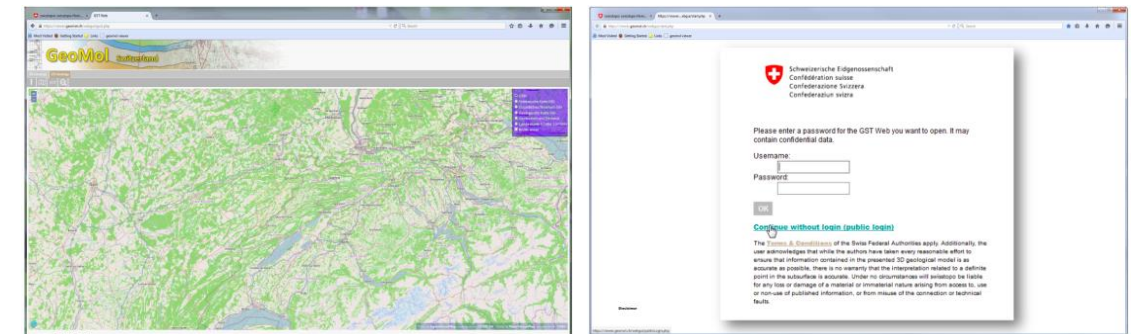


Characterization of the Swiss underground

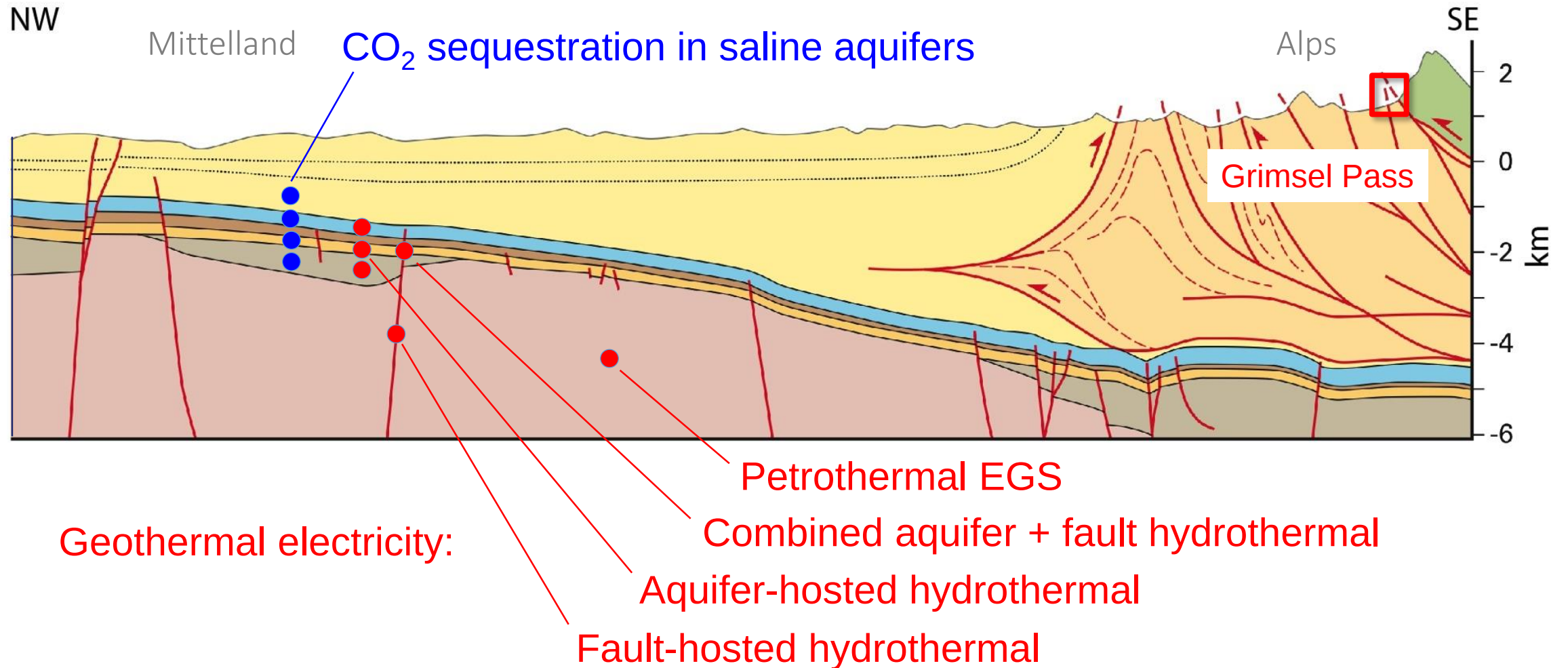
- ✓ Swiss task led by Geological Survey@swisstopo
- ✓ SCCER-SoE and GeoMol (EU & CH)
- ✓ GeoMol CH: 1:50'000
- ✓ Re-evaluation of seismic data



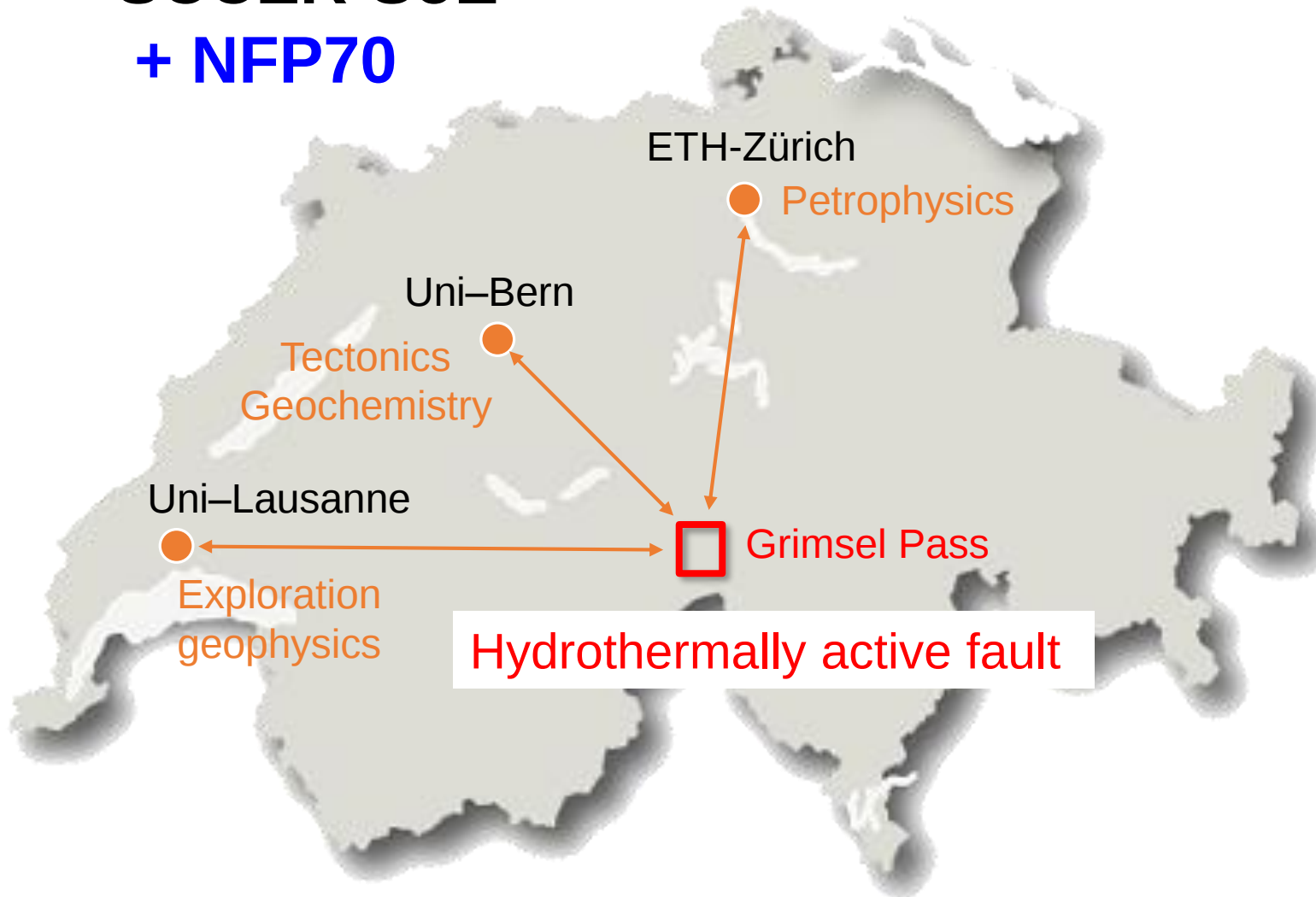
On-/offline access interfaces



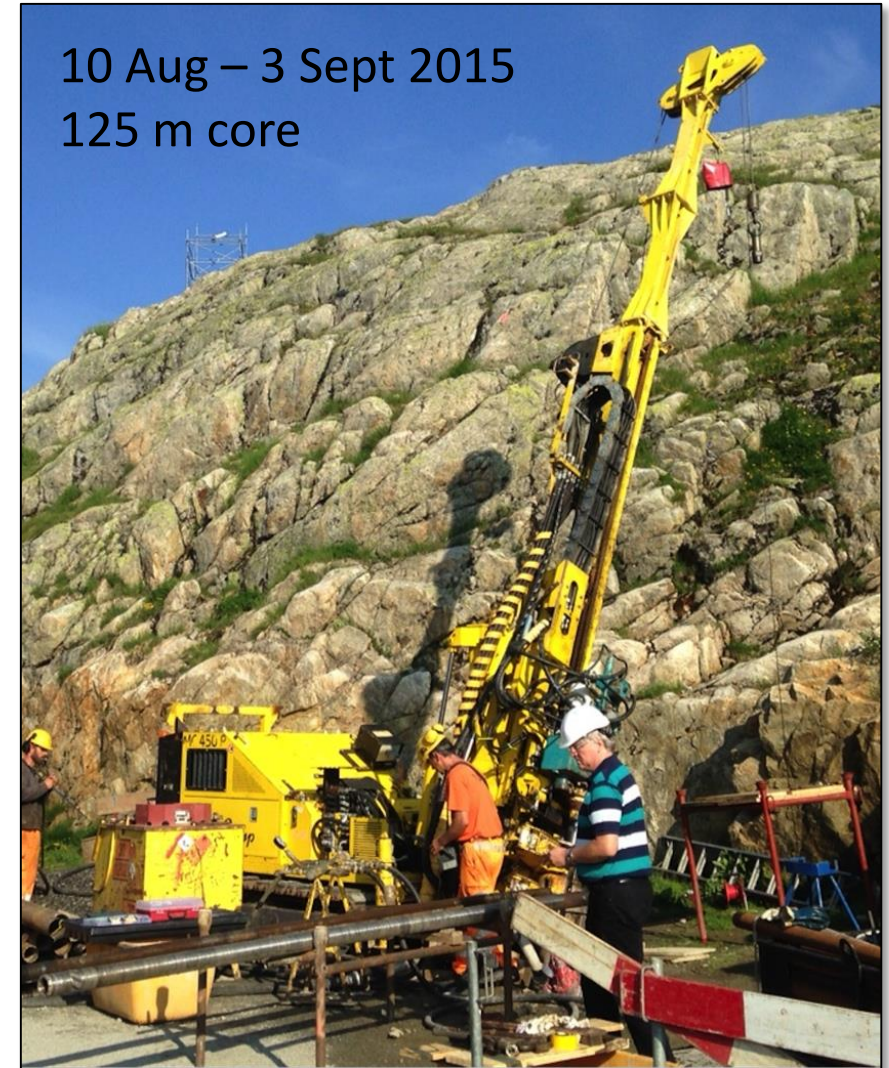
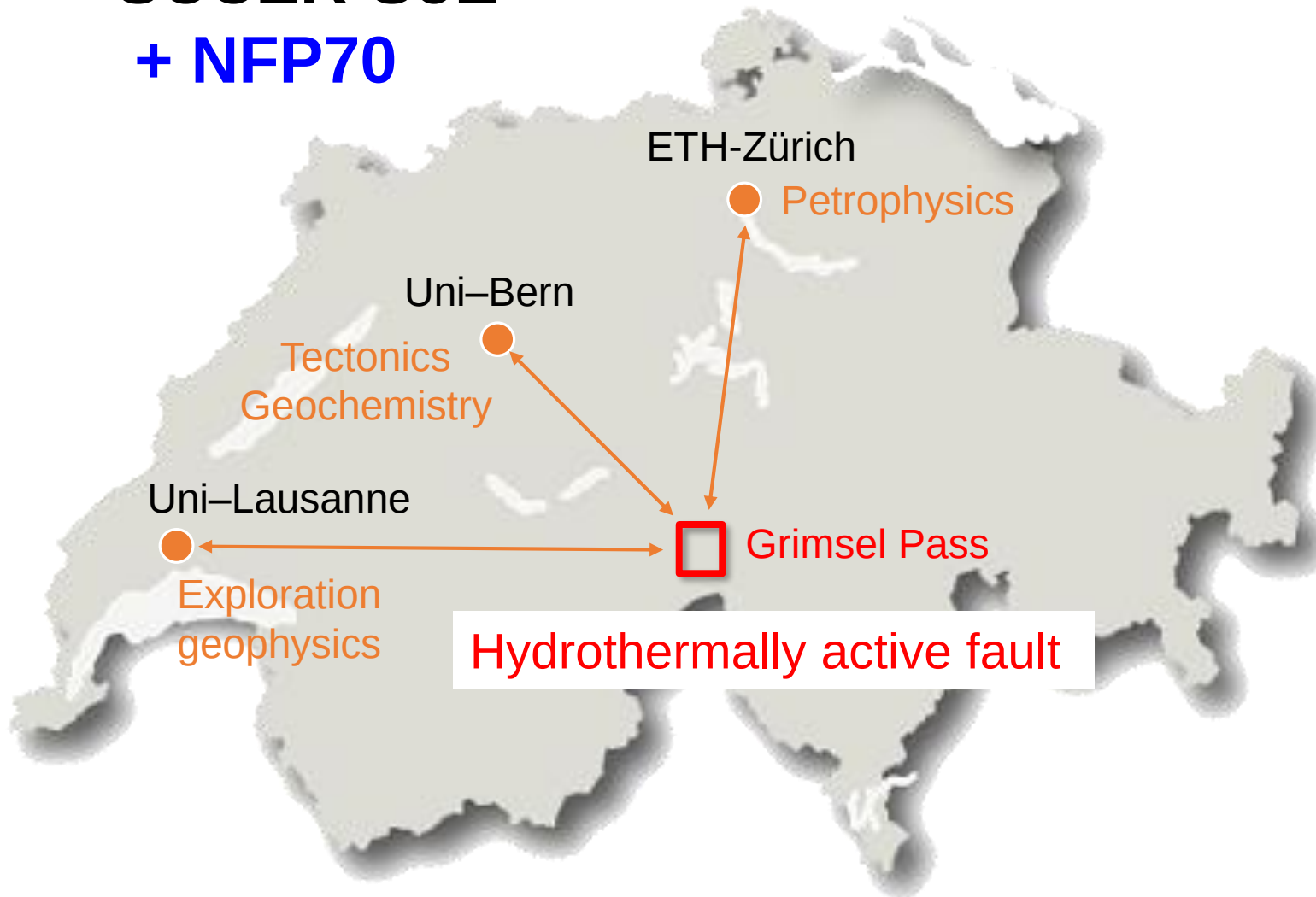
Exploration & characterization of underground reservoirs



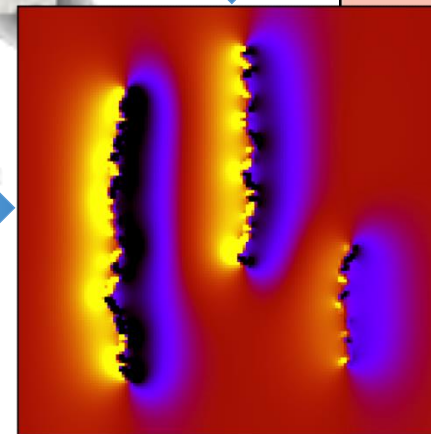
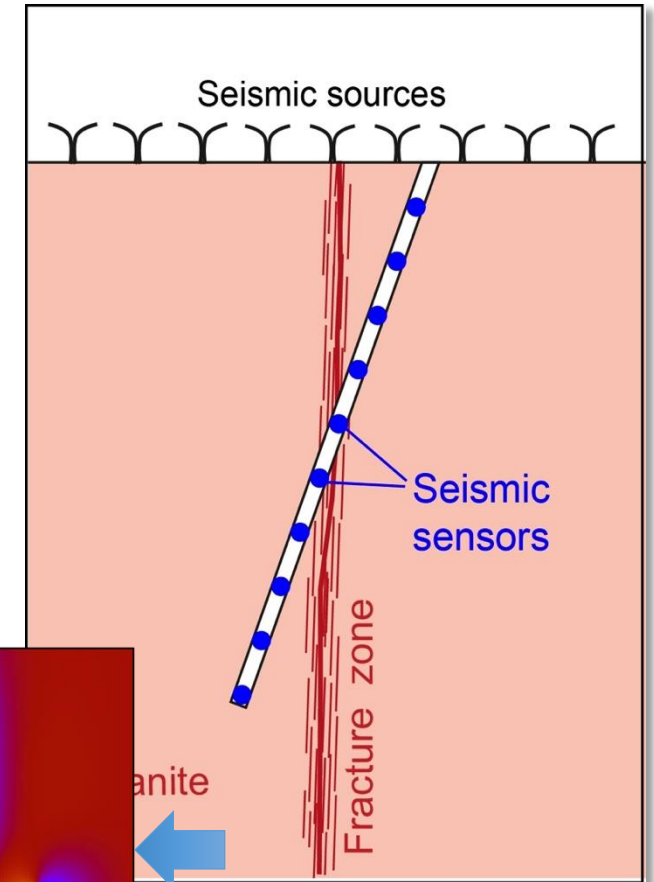
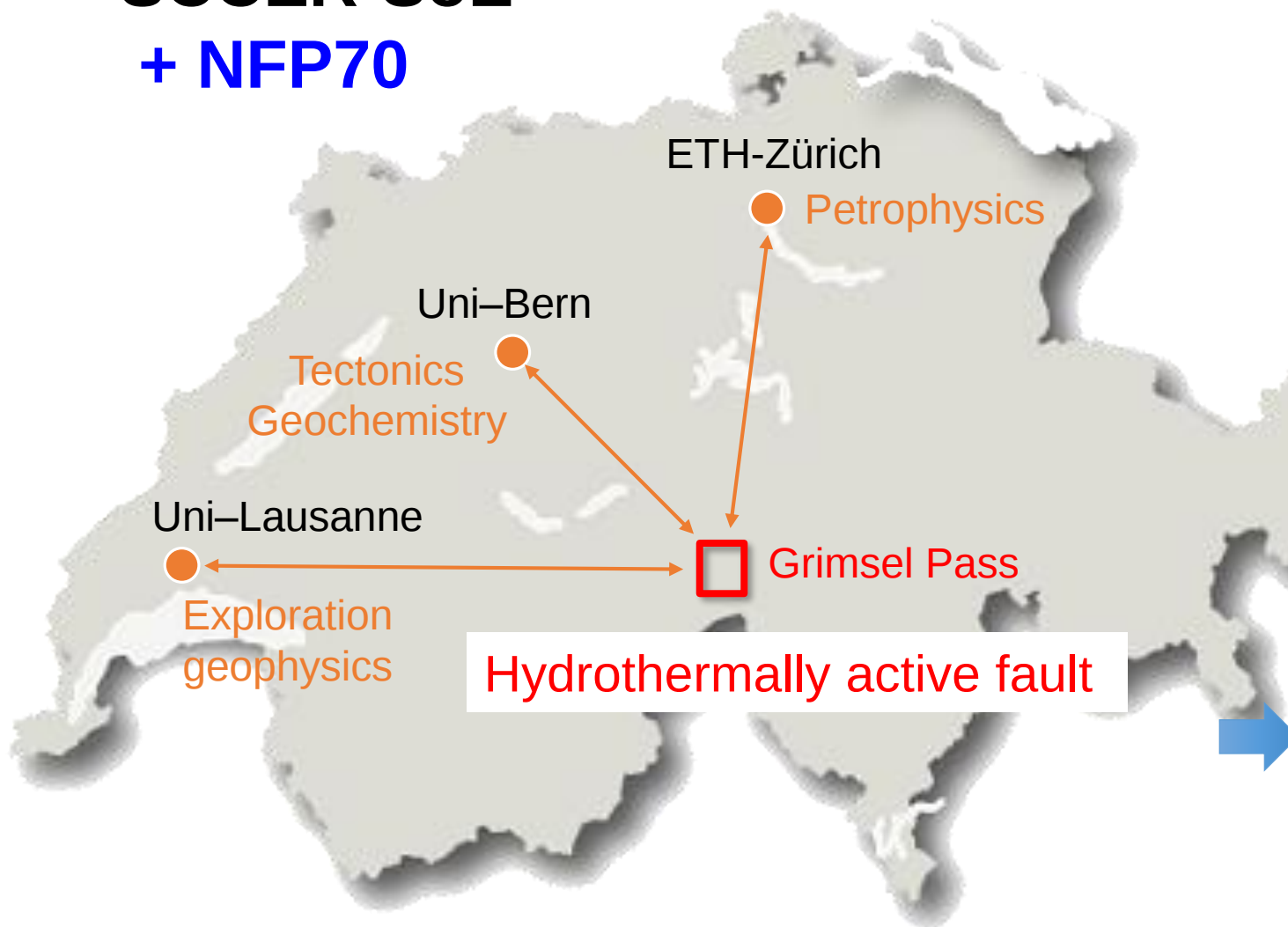
SCCER-SoE + NFP70



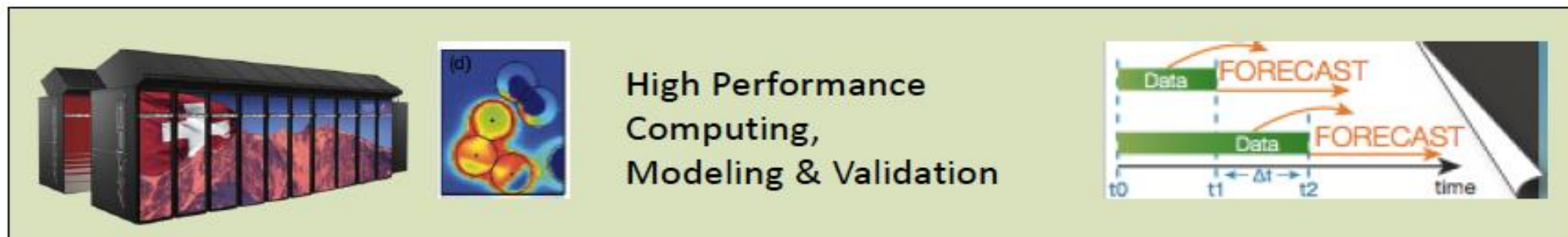
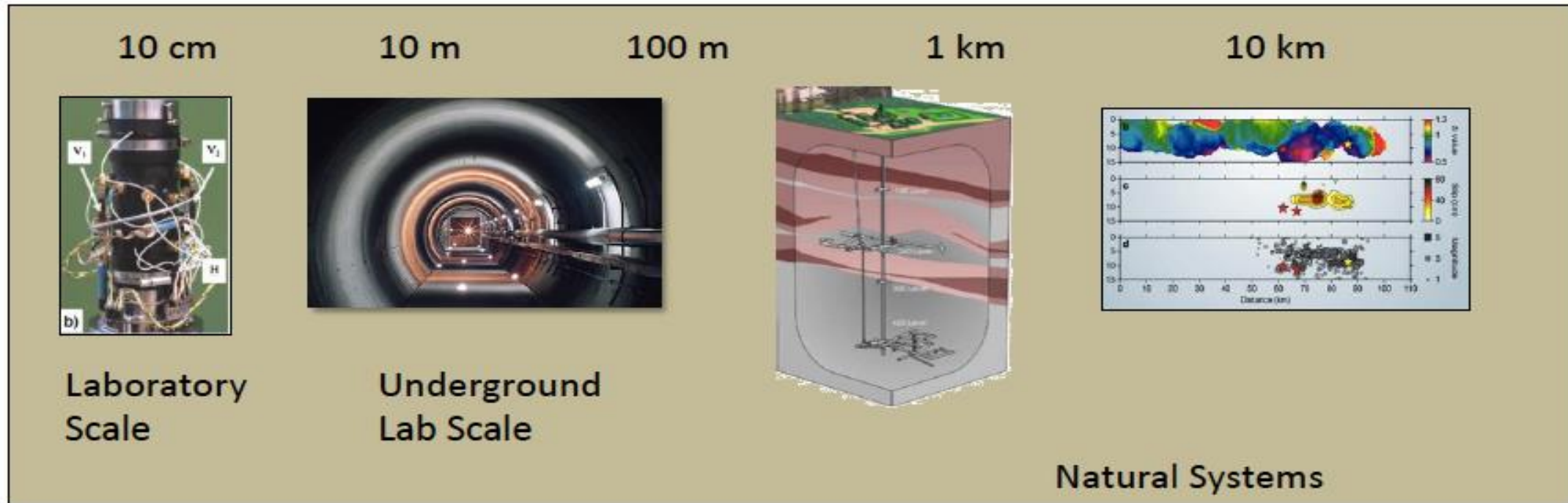
SCCER-SoE + NFP70



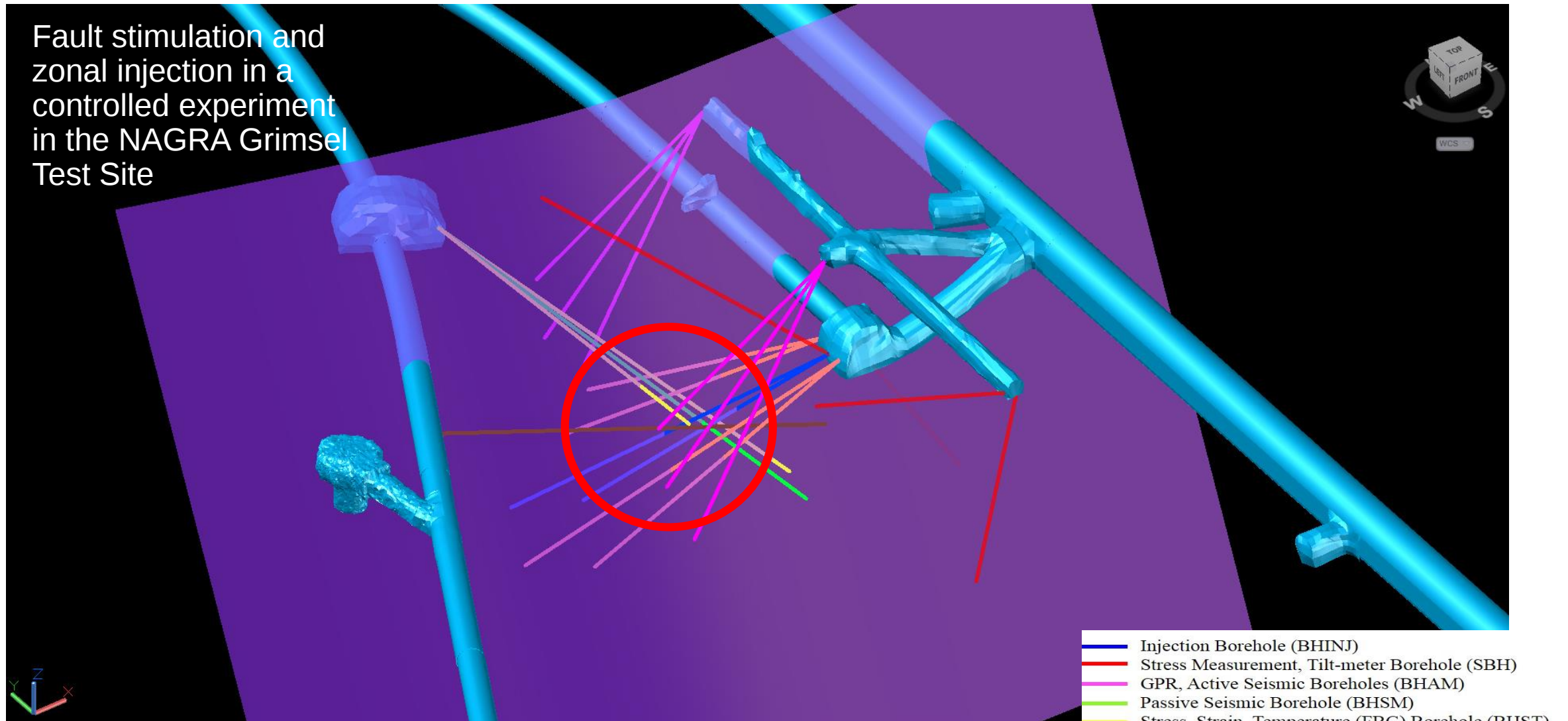
SCCER-SoE + NFP70



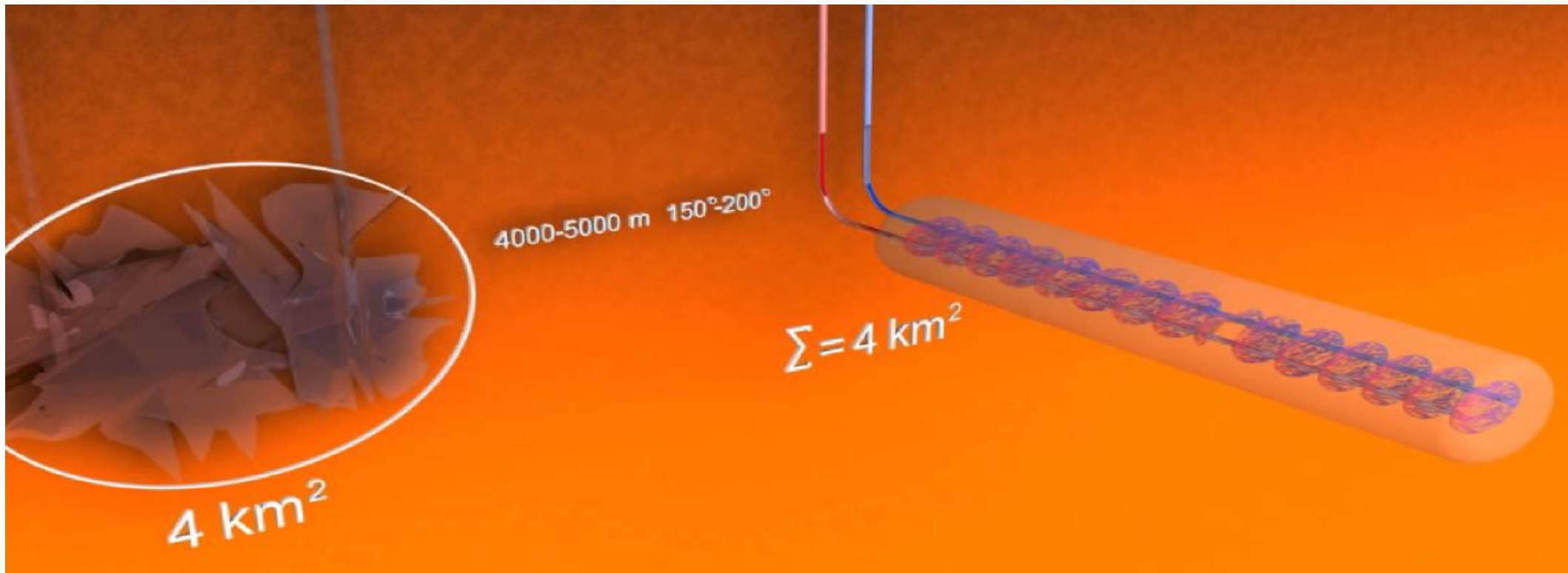
Multi-scale experimental & modeling approach



Fault stimulation and
zonal injection in a
controlled experiment
in the NAGRA Grimsel
Test Site



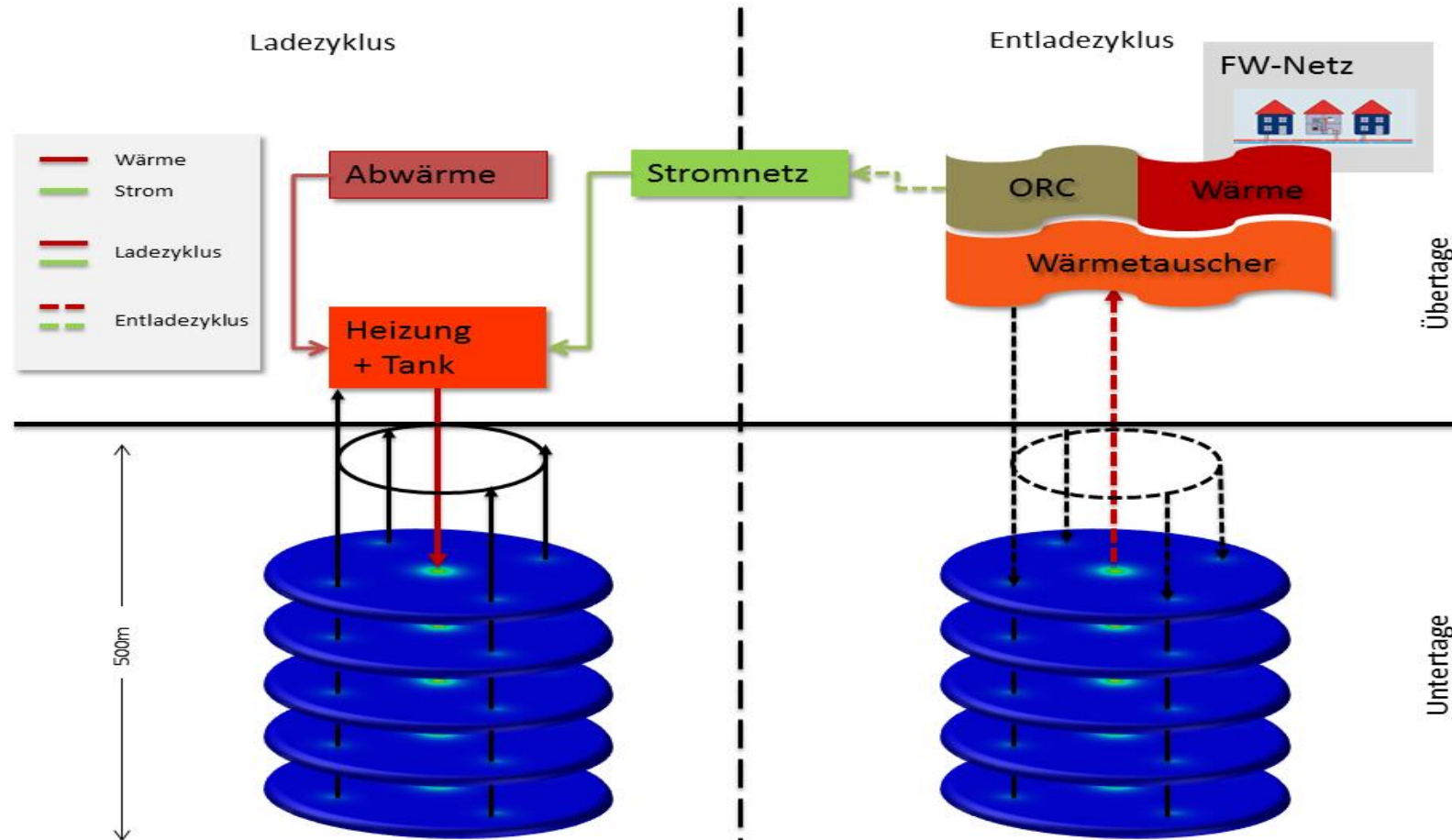
Goal: validate new technologies to minimise seismic risk and maximise energetic yield in EGS

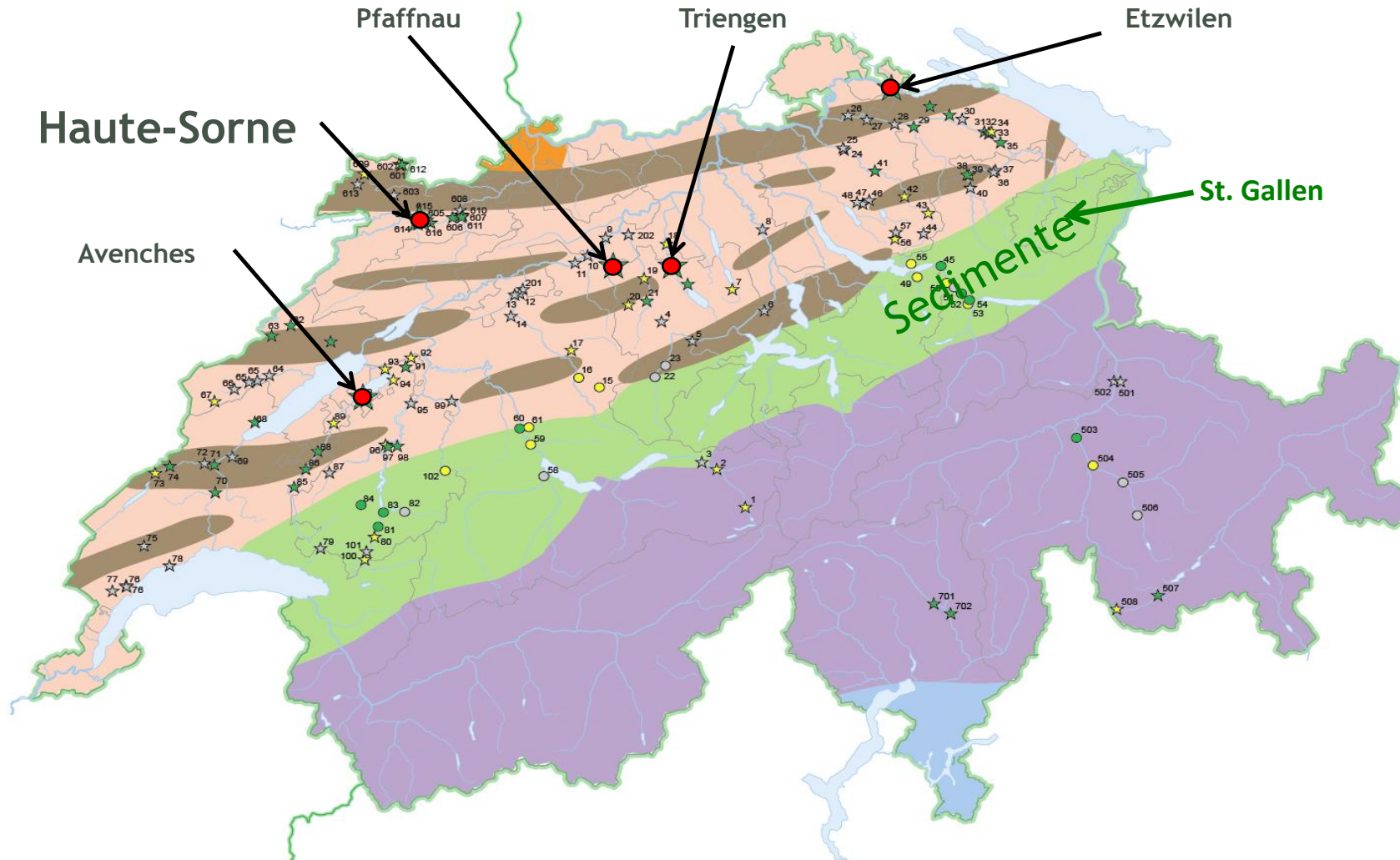


„Old“ Basel EGS concept

„New“ multi-stage EGS concept

Goal: develop underground heat-storage capacity using EGS technology



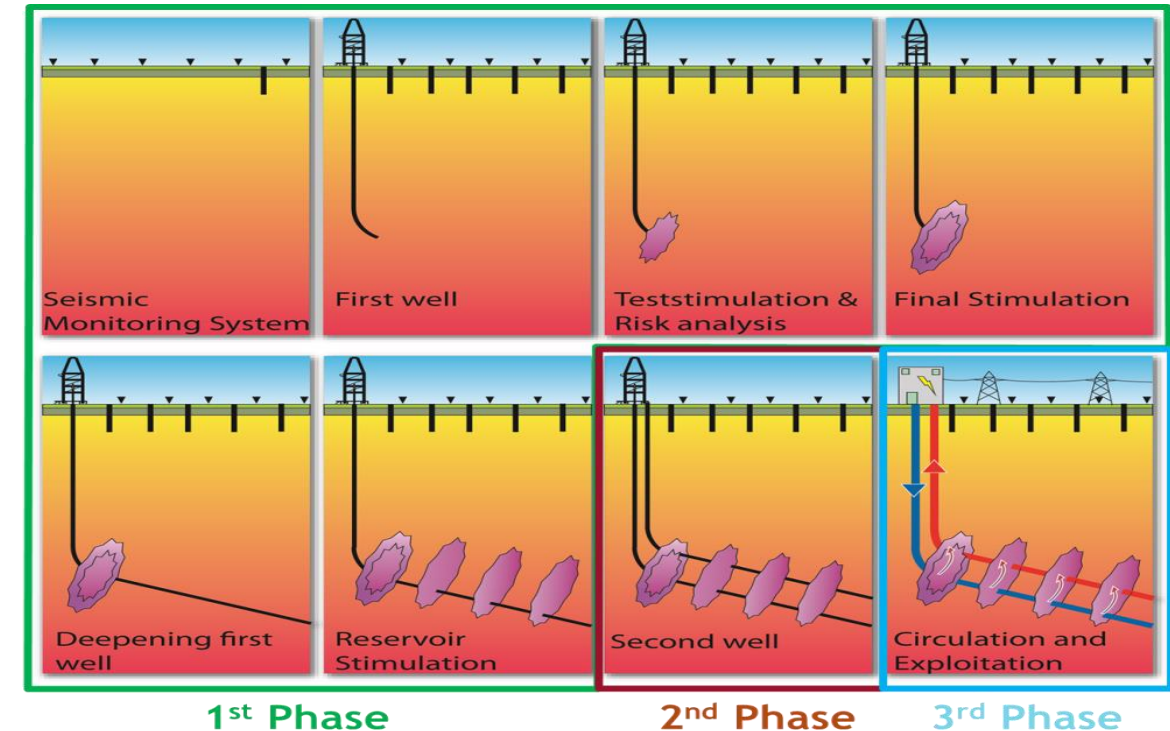


130 potential sites for pilot projects were evaluated within different plays within crystalline basement and sediments

The Haute-Sorne project in Canton Jura is a deep geothermal pilot project that aims at producing electricity and heat using petrothermal or EGS technology. It is the first project worldwide that foresees multistage stimulation to achieve water circulation between two deep boreholes drilled through the crystalline basement.

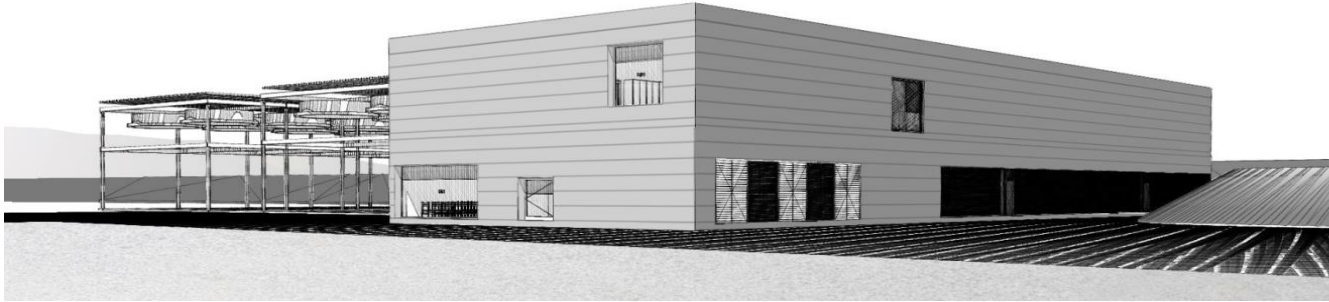
R & D

- ✓ Industry partner SCCER-SOE
- ✓ CTI Projects RAMSIS-RT, DG-WOW
- ✓ H2020 projects: DESTRESS, Thermodrill



- 1st Phase: 2016-2019
- 2nd Phase: 2019-2020
- 3rd Phase: 2021-2022

Haute-Sorne project site, Canton Jura
Permit delivered June 15, 2015 !
First drilling to start in 2018 !!



Peter Meier,
CEO, Geo-Energie
Suisse

Philippe Receveur,
Ministre de l'environnement
et de l'équipement

Jean-Bernard Vallat,
Président de la commune
de Haute-Sorne



Schlusswort

- Das SCCER Programm ist ein einzigartiges Element im nationalen Forschungssystem und ein gutes Beispiel von Relevanz und Mehrwert mit nationaler und internationaler Dimension.
- Jedes SCCER ist ein Kompetenzzentrum innerhalb der Energiethemen von nationalem Interesse geworden. Es liefert innovative R&D und integriert andere relevante Programme auf nationaler und internationaler Stufe und bildet ein Netzwerk, welches auf den Stärken der Partner (ETH Bereich, Universitäten, Fachhochschule) und auf der Qualität der schweizerischen Forschungsumgebung beruht.
- Ein Kernelement ist das Erarbeiten und die Implementierung der Technologie-Roadmaps zusammen mit der Industrie und den Bundesämtern für unser Energiesystem der Zukunft.