



GEO THERMIE
SCHWEIZ SUISSE SVIZZERA

connect

Forum 2021

Heat from the earth to tackle global warming

**Application examples from the Geothermal Forum 2021,
with links to all sessions, presentations and videos**

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Heat from the earth

Natural energy beneath our feet

At the end of September 2021, 300 experts from 11 countries met at the first Swiss national geothermal energy forum in Fribourg. The topic was the development of the geothermal potential that lies beneath our feet. By 2050, 25 % of Switzerland's heating needs could be met by geothermal energy in a CO₂-neutral way. Geothermal energy thus makes an important contribution to the energy turnaround and the reduction of CO₂-emissions. In addition, geothermal energy creates regional added value; in other words, it is an economic sector that is in full development.

**«WE WANT AND NEED TO USE IT - THE HEAT OF THE EARTH.
FOR THIS WE NEED YOU ALL!»**



Nathalie Andenmatten Berthoud
President Geothermie-Suisse



«THINK BIG AND SCALE-UP WITH PARTNERSHIPS!»

Marit Brommer
Executive Director IGA
International Geothermal Association



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the future!

www.connect4geothermal.ch

The geothermal decade

The first national geothermal forum took place on 21st September 2021. About 300 participants from 11 countries attended the forum on site and on-line. 8 sessions, 34 presentations with simultaneous translation in three languages (FR/DE/EN) provided content. On the marketplace with stands and more than 200 1to1 meetings, actors from different sectors connected to develop the geothermal energy sector with aim to use more of the regional energy available under our feet for decarbonisation and to create local added value.

«We want to and must use it - geothermal energy»

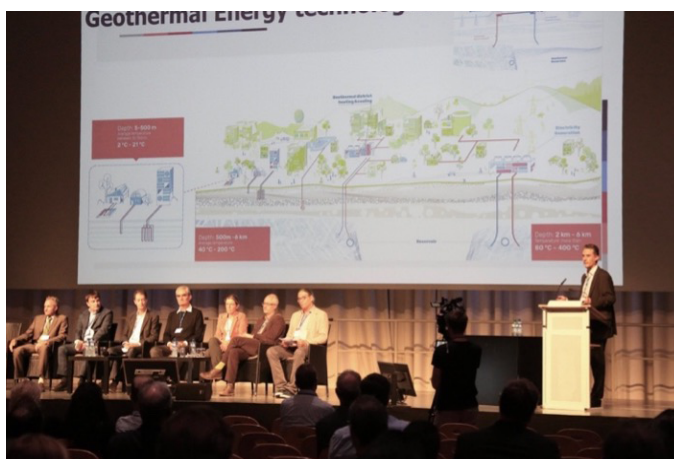
Nathalie Andenmatten Berthoud from Geothermie-Suisse opened the first national geothermal energy forum in Fribourg with this appeal. And the potential must be released quickly. The potential lies beneath our feet, but apart from geothermal probes, it is still not used very much. «25% of Switzerland's heat requirement can be covered by geothermal energy, which is CO₂-neutral and has regional added value.» This has been shown by studies in Switzerland and Europe. The various geothermal energy systems available on



the market for heating, cooling and electricity are used in many places.

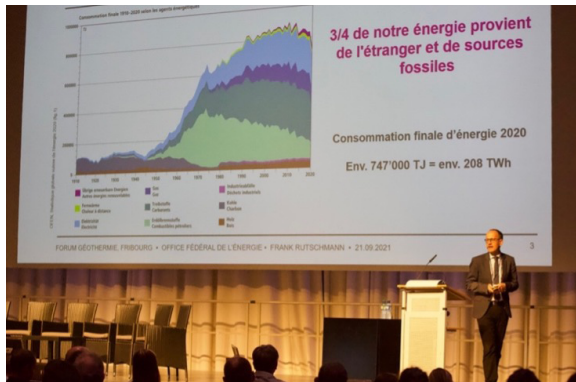


«In order to access geothermal energy, it is necessary to take into account higher interests and inter-cantonal coordination at the federal level for energy master plans.» Serge Boschung - Energy Direction Canton FR



«The geothermal decade for decarbonisation has begun.»
Philippe Dumas, Director EGEK – European Geothermal Council

To exploit this energy potential, it is necessary to start with spatial planning and energy master plans. «As with hydropower and wind power, overriding interests must be put forward in the cantons and coordinated at federal level for geothermal energy». This was the plea of **Serge Boschung from the Energy Department of Canton Fribourg.**



«We are dependent on continuously available energy at very low prices.»

Frank Rutschmann, Swiss Federal Office of Energy



«We are creating a regional dynamic of cooperation with the different actors to accelerate change. There is no room for particular interests in the face of the climate emergency.»

Christian Brunier, CEO at SIG, Services industriels de Genève

The various renewable energies must be used in a complementary and combined manner for the energy transition. «Even after the rejection of the CO₂ law, the ambitious climate and energy policy goals of the Federal Council remain intact. Geothermal energy can make an important contribution to achieving these goals, both in the heat and electricity sectors», said **Frank Rutschmann from the Swiss Federal Office of Energy**.

Time is running out

Compared to the high expectations of the energy transition - which also originate from national politics - the pace is currently too slow. It must be accelerated. «To accelerate change, we are creating a dynamic of regional cooperation and added value with the various players - the Confederation, the canton of Geneva, the canton of Vaud, neighbouring France, SIG, the university, the university of applied sciences and regional companies. There is no room for particular interests in the face of the climate emergency.» **Christian Brunier, CEO von SIG**, emphasised the importance of this cooperation, which is particularly experienced in the GEothermies programme. «Geothermal energy is crucial for Geneva to achieve decarbonisation and respond to the climate crisis,» he stressed.

It takes ambition to move forward. «Think big», encouraged **Marit Brommer from the International Geothermal Association** die Teilnehmenden ermuntert. «You are the actors. Enter into partnerships to achieve the geothermal decade for decarbonisation.»

Achieving the energy transition together

The interaction between players from different sectors was highlighted during the final panel discussion with **Philippe Dumas** (European Geothermal Council), **Nathalie Andenmatten Berthoud** (Geothermie-Suisse), **Gianni Operto** (AEE Suisse), **Ronny Kaufmann** (Swisspower), **Andreas Hurni** (Swiss federation for district heating), **Stephan Peterhans** (Swiss federation for heat pumps) and **David Stickelberger** (Swissolar).



«On this podium we are all agreed. Now it's about implementation.»

The representatives of these associations agree that, together and in combination, the various renewable energies can contribute to decarbonisation. Joint action is needed to achieve this, for example in terms of training and further education as well as for information and communication. Other associations from the engineering, architecture and building technology sectors should also be integrated to make optimal use of the renewable energy supplied in buildings..

A close alliance of the sub-sectors alone is not enough to solve the challenges ahead. The framework conditions must also be right. Representatives of these economic sectors expect support from energy, environmental and spatial planning policy. Greater coordination of procedures and regulations between the cantons, as well as better coordination with federal policy, are necessary to accelerate the energy transition. Simplification of the overall system is essential, and all players are called upon to contribute. To achieve this, it is necessary to build and cultivate a mutual understanding of each other's reality.



Do YOU think of geothermal energy?

A rapidly developing sector

During the Forum, the ambition of the players on the geothermal scene to make their contribution to the energy transition was clearly perceptible. This economic sector has the wind in its sails and is driven by a great dynamism ... the power of the earth? What is certain is that the players from the various stakeholder groups are committed.



The moderators report on the momentum felt in the different sessions:

Vincent Badoux (Geotest), **Benoît Valley** (University of Neuchâtel), **Joachim Poppei** (CSD Engineers), **Karl-Heinz Schädle** (Schädle GmbH), **Michel Meyer** (SIG), **Olivier Lateltin** (Swisstopo), **Cédric Höllmüller** (Geothermie-Suisse).

Examples of projects throughout Switzerland

Numerous projects demonstrate the contribution of geothermal energy for decarbonisation, already today and even more tomorrow.

The dynamics of geothermal energy for the energy transition are very strong in French-speaking Switzerland:

For example, the **Programme GEothermies** with the **Canton of Geneve**, **SIG** and various partners from neighbouring regions of France, which aims to produce 20% of the heat in **Geneva** by geothermal energy by 2035.

Straddling the border, around CERN, a low temperature energy network supplies an industrial and residential area of the Pays de Gex. **Gilles Bouvard from Terrinov** explained how this has created a regional ecosystem for innovation and entrepreneurship..

Roland Stoll from Stoll Frères explained why and how he wants to use hydrothermal geothermal energy to heat his greenhouses in his vegetable production company in **Yverdon-les-Bains**. «Our main customers, the supermarkets, are demanding vegetables produced without CO₂ emissions from 2025. Geothermal energy is the natural answer to this demand».

As **Niels Giroud from SIL - industrial services Lausanne** said, «hydrothermal geothermal energy is an indispensable resource for the city of **Lausanne**'s climate plan». Preparatory work is underway to develop this resource. A 2D seismic campaign has taken place, the company Geool AG has been founded with various energy suppliers in the region, exploratory drilling is in preparation and two energy plants using hot groundwater should be in operation by 2030.

Daniel Clément from EnergieÔ explained the process of accessing hydrothermal heat from underground in the **La Côte** region with 8 municipalities. An important intermediate step has been taken: the seismic campaign for digital mapping. «One step at a time, we are burning to succeed», say the shareholders of EnergieÔ.

Also in the German-speaking part of Switzerland there are projects demonstrating the contribution of geothermal energy to the reduction of CO₂ emissions:

Evelyn Rubli of IWB explained the ambitious goal of abandoning fossil fuels in **Basel** and expanding district heating networks. Hydrothermal heat will continue to play an important role in this. «The cooperation agreement between the IWB and WVR (Riehen district heating network) was signed to carry out a 3D seismic campaign in Riehen and the southern Rhine.»

Martin Dietler from Primeo Energie presented how the heating and cooling of the Switzerland Innovation Park **Basel** site is managed with the help of geothermal probes. «The demand for cooling in the building stock will continue to increase. The use of the ground as a thermal battery therefore has a great future.»

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Since 1994, the subsoil of **Riehen** has been continuously supplying the district heating network with hydrothermal heat, **Karl-Heinz Schädle** mentioned. «By 2020, the natural hot water from the ground will have supplied about one third of the 950,000 MWh of Riehen's district heating network. The expansion with the «geo2Riehen» project is planned. Today, the implementation of a 3D seismic campaign will enable a digital mapping of the subsoil on the Swiss-German border.»

In **Davos**, a hydrothermal power plant has been supplying the town with heat since 2018. **Stephan Bolay from Geotest** explained how this hot water comes naturally from an artesian spring and supplies this heat to the district heating network. In 2020, this heat source combined with geothermal probes provided 54 GWh/a of Davos' 330 GWh/a heat demand. The achievable potential is 135 GWh/a, or more than one third of the total heat demand.

Martin Jutzeler from EWB reported on the progress of the **Geostorage Bern** project. EWB is building a large underground reservoir to store the heat produced in summer by waste incineration. This heat can then be used for the district heating network in winter. This is one of the pilot demonstration projects of the **European Heatstore project**.

In **Zurich**, the Friesenberg low temperature energy network shows how the cooling demand of data centres in the service sector can be optimally combined with the heat demand of the residential sector at one location, with the underground serving as a storage facility. For **Matthias Kolb from Anex Engineers**, this is a matter of course: «The demand for cooling in building stock will continue to increase. The use of the ground as a thermal battery therefore has a great future.»

The examples from the **Netherlands** presented by **Dio Verbiest from Geothermie Nederland** were also impressive: Greenhouses heated with hydrothermal energy and large hybrid networks.

There are many more projects that could not be presented at this year's Forum...

Systemic approach

In all projects, different systems interlock and complement each other. The interaction between these systems is important, both for the energy efficiency of the overall system and for the cooperation between all actors and the development of the geothermal industry, generating added value. Aspects of the systems approach were also highlighted in various presentations at the forum:

Depending on the requirements, the geographical conditions and depending on the field of application, **different geothermal technical systems** are used to enable an optimal use of this natural energy source. **Katharina Link from Geothermie-Suisse**, gave a corresponding overview and the basic criteria of what can be used, where, for what, at what cost and for what performance.

Combining geothermal energy with heat pumps can produce more heat or cooling. **Fabrice Rognon from CSD Engineers and from the Swiss federation for heat pumps** explained what needs to be taken into account and how to do so in the corresponding energy concepts.

Geothermal energy is extracted vertically from the subsoil and then distributed horizontally to sites and districts. **The coupling of geothermal energy with district heating networks is essential**. **Andreas Hurni from the Swiss association for district heating** explained different scenarios on how this interaction can be strengthened.

How can the subsoil be optimally used for energy storage and seasonal phase shifting? How can these storage properties be modelled and integrated into the planning of urban energy systems? These questions have been answered by the European project Heatstore. **Luca Guglielmetti and Fleury de Oliveira from University of Geneva** presented the results and the corresponding modelling for Switzerland and more specifically for Geneva.

Geostructures can also store heat and coolness underground. This means that underground construction can improve energy efficiency in urban areas, in new buildings as well as in the existing building fabric. **Alessandro Rotta Loria from geog** demonstrated this with the help of various examples in Switzerland and abroad.



«The project has generated an innovative entrepreneurial ecosystem across borders.» Gilles Bouvard, Terrinov

The storage and phase-shifting properties in the ground are also the interface for the **optimal combination of solar and geothermal energy**. **Florian Rüesch from the institute for solar technology** showed why and how this combination generates added value, using various examples of important buildings.

Martin Jakob from TEP Energy presented background information on the **CO₂-neutral heat and cooling requirements in urban areas in Switzerland**, as well as analyses and conclusions on what geothermal energy can contribute to this.

Hydrothermal heat offers a great potential that is still little used in Switzerland, except for thermal baths, although the corresponding technology is mature and widely used in regions such as Paris and Munich. **Fabienne Sierro from ZHAW** investigated the reasons for this situation and how to change it within the framework of the Transfer programme. She presented the results of the project **Start-up support for hydrothermal projects in Switzerland**.

The development of geothermal energy is directly linked to the geological conditions of the subsoil. Thus, geological risks are associated with the development of geothermal energy. **Nicole Lupi from the Federal Office of Energy** presented the **federal support measures for risk minimisation** and presented the results of the European Georisk project.

Subsoil resources: knowing, protecting and using

Compared to other countries with a tradition of subsoil mining, Switzerland has little knowledge of its deep ground. The acquisition and sharing of knowledge and experience is an important pillar to know and use the potential of the subsoil for energy and resource extraction, storage of substances as well as for spatial use and transport, while respecting the natural cycles of the earth. These aspects were also discussed at the forum.

Gunter Siddiqi, former head of geothermal and carbon storage at the Federal Office of Energy explained the **links between subsoil knowledge, innovation, competitiveness and access to data**. The basic elements are there. «What is needed is innovation for the competitiveness of deep geothermal energy, the acceleration of activities for the return on investment, the consideration of new requirements such as CO₂ storage and sustainable availability and access to subsoil data. This is a challenge in a federal system like Switzerland.»

The Swiss subsoil has been and is still being investigated for the storage of radioactive waste in deep geological repositories. **Bernd Frieg from Nagra** presented the **on-site investigations and the data and results obtained by Nagra**. Numerous boreholes and seismic campaigns are documented in the project reports. Nagra has already collaborated in geothermal projects and is interested in further collaborations.

Exploratory drilling is an important step in the exploration of the subsoil. It identifies sites with energy potential in the subsurface, known as geological reservoirs. With aim to simplify the exploration of the subsoil for geothermal energy in Switzerland, the project **Minimum data for exploratory drilling** was launched as part of the Transfer programme. **Maximilian Keim from Geothermie-Allianz Bayern** explained what this data consists of and how it is obtained. The project is still ongoing and aims to propose an appropriate recommendation taking into account both scientific knowledge and the reality of implementation in practice.



A digital model of the Geneva subsoil is created with a 3D seismic campaign.

3D seismic campaigns are used to create 3D digital models of the subsurface. This makes it possible to determine precisely what can and cannot be done, how, for what purpose and with what effort in which underground regions, aiming to ensure a balance between use and protection of the subsoil. In autumn 2021, such a **3D seismic campaign is being carried out in Geneva** as part of the GGeo-thermies programme. Specially equipped vehicles are used to send vibrations into the ground and the echo is measured with appropriate instruments. **Nicolas Clerc of Canton Geneva** and **Frédéric Mirjolet from SIG** explained what it means to carry out such a campaign with 50,000 measurements in the Greater Geneva area..

Switzerland's subsoil offers many possibilities for the extraction and storage of energy and resources, for transport and land use planning, as well as for water regeneration, heat and cooling balance and other natural cycles. To take all these demands into account, a national strategy for the subsoil is currently being developed on behalf of the Federal Council. **Laurent Vulliet, member of the Federal geological commission**, explained the procedure and the current status..

Innovation: electricity generation, lithium extraction, CO₂ storage

Electricity can also be generated using geothermal energy if the temperature is high enough. For this, it is necessary to go deeper underground. In combination with the absorption of heat from underground, it is also possible to extract minerals and metals and to store CO₂ in the ground. The forum also discussed these issues and the current state of knowledge and technology in this area, as well as future innovations.

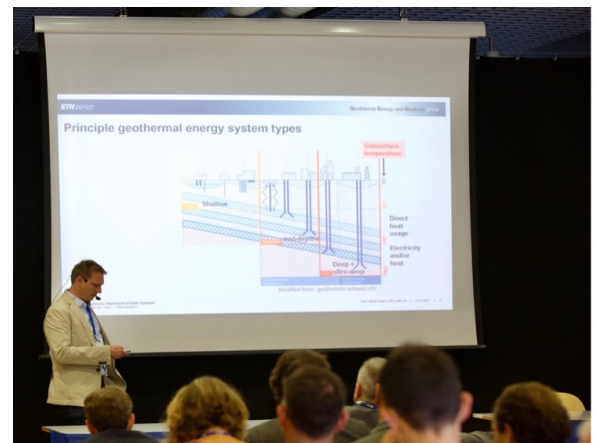
Martin O. Saar from the ETH Zurich gave an **overview of the various deep geothermal systems**: from hydrothermal to petrothermal to «advanced geothermal systems» and the combination of geothermal energy with CO₂ storage and extraction of substances from the subsoil, he explained the state of knowledge and technology.

Tests **to minimise seismic risks** are being carried out in the Bedretto underground laboratory in Ticino. Researchers from various universities are testing different methods and procedures for this purpose. «The interim results are promising,» explained **Olivier Zingg from Geo Energie Suisse**. «The knowledge gained will be used in a wide variety of geothermal energy projects.»

The **combination of geothermal energy with lithium extraction is promising**. **Jean-Jacques Graff from AFPG** explained how this works and what the current state of play is on the border between France and Germany along the Rhine Valley.

Closed Loops or closed systems in the deep underground are a promising development in geothermal energy. As with geothermal probes, a fluid circulates in a closed system underground and absorbs heat, but at a much greater depth than with conventional geothermal probes. **Daniel Mölk from Eavor** explained how Eavor closed loops work, what performance and costs can be expected, and what stage the pilot project in Geretsried is at.

Innovation is very often the work of technical and scientific experts. This is also the case in the field of geothermal energy. But without social acceptance, no innovation takes root. **For geothermal energy, social acceptance is of paramount importance**: without the consent of the local population concerned, no project can be implemented. **Matthias Holenstein von der Stiftung Risiko-dialog** explained the tension between innovation, risk and social acceptance and gave some indications of how geothermal energy can cope with it in Switzerland.



Overview of different geothermal systems

Presentations, videos and pictures



The video recordings of all presentations, with translation in DE, FR, EN, as well as the presentations in pdf format, can be found here:

- Opening: Energy, CO₂, Environment – Potential of geothermal energy
- Geothermal energy: a wide range of applications
- Heat and cold storage with geothermal energy
- Innovation: power generation, lithium extraction, CO₂ storage
- Launch WING Switzerland
- Geothermal heating and cooling for the decarbonisation of the cities
- Heating and cooling in industry: possibilities with geothermal energy
- Underground as a resource: Knowing, protecting and using it better
- Conclusions and appeal for decarbonisation: joining forces for all applications of geothermal energy



Geothermal energy
can cover at least
25 % of the heat demand
in Switzerland

Context and background

*Video and context available in
German and French only*

Market place for an economic sector

«You are developing an economic sector, think in terms of scalable solutions, replicable processes and industrial strategy to make the geothermal decade a reality,» concluded **Philippe Dumas from the European Geothermal Council**. The geothermal sector is booming in Switzerland and its players have been actively using the Forum's marketplace.

Effective networking options

Representatives of federal and cantonal authorities, industrial utilities and energy distributors, geologists, environmental and energy experts from a wide range of companies, financial and insurance companies, universities and research institutions ... the various players in the geothermal value chain were present. Major players from France, Germany, Italy, the Netherlands, Norway, Denmark, Iceland and other countries also participated. They actively used the efficient networking possibilities of the virtual platform www.connect4geothermal.ch and documented their competences, fields of activity, services and products. Thus, they can all easily find the right expertise for their projects and activities. The knowledge and skills database with various filtering options is open to everyone. Searches can be made for **people, organisations, products, services and projects**. Based on these profiles, participants were also able to contact other participants for individual interviews and meet them in person at the Forum thanks to an optimised schedule.



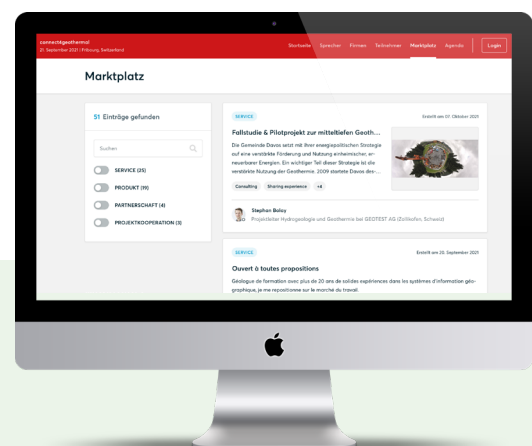
Scheduled in advance: 1-to-1 meetings are very effective for network maintenance and market development of companies, authorities and research institutions



Networking in the heart of the Forum, in the break and stand area.



After the Forum, the platform **www.connect4geothermal.ch** will continue to be used and animated to further facilitate the exchange of knowledge and experience and the development and implementation of geothermal projects.



A total of

296 participants

registered for the first edition of the Forum. The majority of the participants attended the conference on site, while just under 30 participants logged on online.

The conference programme was divided into

8 sessions

– 2 plenary and 6 parallel sessions. Participants were able to follow 4 sessions live. After the Forum, they had the opportunity to watch the presentations of the other sessions online.

186 participants

took advantage of the opportunity to organise 1-to-1 face-to-face meetings.

In total,

244 1to1 meetings

were organised.

The programme included

34 presentations

At the end of the Forum:

1 debate

Next edition:

29 September 2022

Partners

The realisation of this forum and the networking platform that goes with it was possible **thanks to our partners**. We thank them!

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