Services along the hydrogen value chain

Energy generation:

Geothermal energy

HydroHub

H_2 competence @ HydroHub

Our services run along the entire value chain in the hydrogen industry – from generation through transport and storage to use in various fields of application.

Energy generation

Renewables (e.g. wind, solar)

Conventional power plants

Geothermal

H_2 generation

Electrolysis

Seawater desalination plants

Reforming processes

Methane pyrolysis

Distribution/transport

Electrical grid

Pipelines

District heating

Intelligent networks

Refuelling stations/ filling systems

Tankers (lorry, train, ship)

Storage

Battery storage

Gas tanks

Cavern storage (H_2 and CO_2)

Pressure vessels

H_2 hydride storage

Consumption/use

Fuel cell system

Methanol synthesis unit

Carbon capture and utilisation

Mobility (e.g. e-fuels)

Reconversion to electricity

Power to gas (gas, heat, liquid)

Industrial applications (e.g. refinery)

H_2 competence @ HydroHub

We give comprehensive support to hydrogen projects and offer a broad spectrum of services in the concept/planning, production, operation and decommissioning/disposal phases.

Concept/planning

We support you from the start with research and project planning measures and specific tasks. Already at the conception phase, we are there at your side with feasibility studies, strategic and financial consultation and a broad range of organisational and technical services. Alongside concept creation with consideration for legal, technical and economic conditions, we take on the task of analysing the requirements and support you in the process of determining feasibility through basic and design planning all the way to the approval process.

Production

For over 150 years, it has been one of our tasks to analyse and manage technical sources of risk. With our wide range of specific services, we are thus able to offer you competent help in the integration of hydrogen technologies into the industrial value chain. Our range of services runs from fact-finding and construction through project management, administering documentation and operator's obligations, basic and detailed process engineering all the way to project support through geological, environmental and engineering services during the production process.

Operation

We support frictionless operation with our extensive range of services and our primary goal of optimising operational reliability and preventing damage. Our services support you in the implementation of your operating strategies and in the accompanying optimisation, maintenance and upkeep concepts. Our safety-oriented process with operational monitoring and the creation of damage-limitation concepts contributes, in the final account, to establishing hydrogen in the popular conception as a safe and controllable technology.

Decommissioning/disposal

Just as we are there for you in the first concept phase, we are also at your side at the decommissioning phase, providing all the required services for dismantling and disposal – including project management and comprehensive services to handle your operational obligations. We create concepts to the current legal requirements, standards and regulations and support you in identifying, analysing and avoiding the potential risks of your intervention.

Geothermal energy: the challenge of tapping powerful heating potential

In contrast to wind and solar energy, geothermal energy is always available. Its use offers great potential for the extension of renewables and benefits, in Germany, from additional subsidies. It also poses particular challenges, particularly at deep levels.

While surface geothermal energy takes heat or cooling from the upper layers of the bedrock (to 400 m deep) or from groundwater and has contributed for years to the heating and cooling of buildings and infrastructure, deep geothermal energy is only slowly allowing access to deeper hydrogeothermal and petrothermal reservoirs. The exploration and exploitation of these phenomena are technically complex and require, among other things, knowledge of the seismic measurement and evaluation of thermal water-bearing reservoirs and hot layers of rock.

We are your experienced partner for the exploration and use of deep geothermal energy, particularly with a view to limiting the prospecting risks, designing economical wells and estimating and monitoring seismic events. With competent specialists and the most modern analytical and measurement methods, we are there for you from planning through construction to safe operation and will support you in benefiting from subsidies. Do get in touch.

Deep hydrothermal energy in Germany

Even if, in comparison to high enthalpy phenomena such as in Iceland, Italy or Turkey, the bedrock of Germany offers comparatively lower thermal water temperatures, deep geothermal energy could make a notable contribution here to the decarbonisation of district heating networks and process heating, particularly in the southern German Molasse Basin and in the Upper Rhine Valley, but also in the northern German Lowlands.

Hydrothermal energy uses locally limited hot water phenomena – permeable layers of bedrock whose hollows are filled with water, so-called “hot-water aquifers”, and fault zones in sedimentary rocks. These are largely found at depths of more than 400 m to 3 kilometres.

The highest-yield and so-far best exploited occurrences in Germany are in the region around Munich, where hydrothermal energy is already an important component of heating today. Thanks to the high temperature of the thermal phenomenon, geothermal energy also allows for the generation of electricity through cogeneration in these locations.

Deep petrothermal energy under investigation

Unlike deep hydrothermal energy, using locally restricted hot water occurrences, the exploitation of petrothermal deposits is not limited by region. Petrothermal energy uses hot, deep rock as a heat exchange medium and carries the heat via an artificial water circuit from depths of up to 5 kilometres to the surface. To this end, the deep rock is first hydraulically stimulated using injection wells, then the heated medium is brought through production wells to the surface.

Although the potential of petrothermal energy is deemed considerable, its high technological and financial requirements have meant that, to date, it has only been used in research projects.

Prospecting risk and microseismic events

Not sufficiently exploiting a reservoir in quantity and quality is considered a prospecting risk. The yield of an aquifer is measured by the volume of the occurrence and not least by the permeability of the rock. If, with hydrothermal exploitation, the expected permeability is not met, strengthening and stimulation measures can be carried out. These include the acidifying of carbonate rock or hydraulic stimulation. Deflection bores in the effective horizon can increase yield.

To reduce prospecting risk and subsequent measures and ensure the sustainable long-term operation of geothermal projects, a geophysical survey is carried out beforehand to determine the temperature range, tectonics, hydrochemistry, seismic activity and other factors. Also required is continuous monitoring of the plant to determine and assess thermal and hydraulic effects, say, a loss of temperature along the well or microseismic events that could have an effect on the surface above.

Our services

From the first deep exploration using seismic analysis and the modelling of underground structures, we deliver knowledge for the secure execution of geothermal wells and projects to exploit deep-level geothermal energy. With comprehensive services in the fields of consulting, engineering and training, we support you in the following phases of your project:

	Concept/ Planning	Production	Operation	Decommissioning/ Disposal
Creation of exploratory concepts:	●	●	●	
○ collation of *a priori* information: geological maps, existing measurement data etc.	●			
○ If purposeful: re-analysis of geophysical measurements with subsequent reinterpretation for a geological model	●			
○ Creation of an earth-science-based exploratory concept: geophysics, particularly seismography and borehole geophysics, determining measurement geometry, simulation/assessment of the measurement results based on the proposed geological model of the bedrock through coverage schemes, seismic wave coverage and synthetic seismograms	●			
Execution of works in the field of exploration:	●			
○ data research, collation of *a priori* information: geological maps, existing geophysical measurement data, boreholes, literature study etc.	●			
○ If purposeful: re-analysis of geophysical measurements with subsequent reinterpretation for a geological model	●			
○ Creation of an earth-science-based exploratory concept: geophysics, particularly with 2D/3D seismography and borehole geophysics, determining measurement geometry, simulation/assessment of the measurement results based on the proposed geological model of the bedrock through coverage schemes, seismic wave coverage and synthetic seismograms	●			
○ Approval processes: support and consultation on official processes to execute exploration measures	●			

	Concept/ Planning	Production	Operation	Decommissioning/ Disposal
○ Public relations: town halls, talks, webinars, press releases etc.	●			
○ Execution of the geophysical exploration of the surface of the earth: aerogeophysics, gravimetry, 2D/3D/4D seismography, seismic refraction, accompanying vibration measurements to DIN 4150, quality control, field processing and data analysis	●			
○ from boreholes: seismic tomography, VSP (vertical seismic profiling), 3D borehole radar, standard borehole geophysics	●			
Evaluation and collation of all data available:	●			
○ evaluation of geological, geophysical and hydrogeological information	●			
○ Evaluation of geophysical measurement data, particularly seismic data: pre-stack and post-stack processing, PSTM/PSDM, CRS, AVO, IME etc.	●			
○ Interpretation with the involvement of all data	●			
○ Seismic attribute analysis	●			
○ Hydrogeological modelling, including heat flow simulation/heat transport model, thermal conductivity, rock pressure etc.	●			
○ Creation of a 3D geological structural model, spatial distribution of deposit parameters	●			
○ Selection of the well site and target (bore path planning)	●			
○ Acquisition of rights, planning/route engineering for the supply lines	●			
○ Support for drilling works, scanning and hyperspectral analysis of the cores (CoreScan and Anchorelog) for core drilling sections	●			
○ Execution of borehole measurements	●			
○ Support for hydraulic packer tests, testing	●			
○ Seismic geomonitoring both during drilling and stimulation, potentially to fulfil requirements made under mining law	●			

	Concept/ Planning	Production	Operation	Decommissioning/ Disposal
Support for drilling and verification of the geological/hydrogeological model		●		
Seismic vibration geomonitoring during the drilling and stimulation phase		●		
Creation of soil analyses, soil investigation		●		
Foundation concepts		●		
Creation of risk analyses, safety concepts		●		
Provision of a “SiGeKo” (health and safety coordinator)		●		
Construction supervision		●		
Geomonitoring (seismic vibration, hydrogeological recording) during the production phase with safeguard			●	
Creation of risk analyses, safety concepts for operation: fire safety concepts, provision of a “SiGeKo” (health and safety coordinator) etc.			●	
Monitoring of technical parameters, wear parts etc. with the web-based safeguard system with the option of an alarm function			●	

HydroHub

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