Services along the hydrogen value chain

H_2 generation:

Seawater desalination plants

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.

Seawater desalination for the production of green hydrogen

Germany's National Hydrogen Strategy foresees not only the production of green hydrogen but also its importation – first and foremost from north and west Africa, as it is there that it can be produced very cheaply using solar and wind energy. Providing fresh water in sufficient quantities for electrolysis without exacerbating local shortages is a challenge. Desalination technologies make a decisive contribution here. The development, set up over the long-term, of suitable infrastructures is accompanied by significant benefit for the entirety of society in the producing region and offers great potential for scientific collaboration and development aid.

We are your partner for the development of economical hydrogen production – particularly with a view to importing it from windy, sunny regions and using desalination plants. With the most modern analytical methods, measurement processes and competent specialists, we are at your side to carry out your project safely and successfully, and to help you benefit from subsidies as available. Do get in touch.

Processes for seawater desalination

The established processes to desalinate seawater break down into thermal distillation and membrane-based pressure filtration processes.

THERMAL DISTILLATION

- Multi-effect distillation (MED)
- Multi-stage flash distillation (MSF)
- Thermo-vapour compression (TVC)

High energy requirements: In the thermal process, the water is pumped out of the sea and through condensation stages. To take the water to over 100 °C, heat is used above all from gas and oil power plants, but also nuclear ones. For 1,000 litres of water, around 100 kilowatt-hours of energy are needed.

Above all in the dry, sunny Middle East and North Africa region, thermal processes have made an important contribution for years to freshwater supplies. Today, they can be optimised through hybrid concepts and make possible, e.g. with joint solar and fossil operation, the transition to a sustainable energy economy.

MEMBRANE-BASED PRESSURE FILTRATION

- Reverse osmosis (RO)
- Nanofiltration (NF)
- Electrodialysis (ED)

Efficient energy management: Thanks to powerful high-pressure pumps that force seawater through special membranes and efficient energy recovery systems, reverse osmosis has gained ever greater importance as a leading desalination technology. For each 1,000 litres of water, the most modern plants only need 2.5 kilowatt-hours of energy.

In sunny and windy coastal areas, desalination by reverse osmosis allows the economical production of green hydrogen. To exploit electrolysers intensively, it is best to use locations where high levels of solar energy are available by day and plenty of wind at night. Alternatively, in becalmed times, fuel cells can supply the energy needed.

Our services

In the development and operation of seawater desalination plants, we are there for you to provide all the required services. From creating concepts in compliance with the standards and drawing up specifications to creating specific risk analyses and handling the complete project management, we offer you comprehensive provision in the fields of consulting, engineering and training – in all phases of the project in question:

	Concept/ Planning	Production	Operation	Decommissioning/ Disposal
Creation of concepts to current legal requirements, standards and regulations	●			●
Creating requirements specifications	●			●
Creating technical specifications	●			●
Creating commissioning and periodic inspection concepts	●			
Weak-point analysis, identification and analysis of potential risks	●			●
Creation, consultation on staggered power system protection plans, protection tests	●			●
Conception and consultation (commissioning, periodic inspection) of isolated networks including the incorporation of e.g. decentralised generator units, electrolysers and any necessary storage facilities (on and offshore)	●			
Creation of risk analyses to determine the potential risk of intervention	●			●
Creation of risk analysis and hazard assessments	●			●
Creation of safeguarding concepts	●			●
Consultation, evaluation of electrical and mechanical safeguarding systems	●			●
Consultation, evaluation on installation and operation of alarm receiving stations	●			●

	Concept/ Planning	Production	Operation	Decommissioning/ Disposal
Consultation, evaluation on determination of intervention measures by guarding/security company or police	●			●
Consultation, evaluation on determination of administrative security measures	●			●
Technical advisory services	●			
Project management and document administration	●	●	●	●
Damage assessments and analyses of the causes of damage, creation of avoidance concepts			●	
Analysis and evaluation of damages and measures to prevent comparable faults			●	
Maintenance of breakdown statistics to assess operational reliability in comparable plants/components			●	
Analysis of electrical grids: e.g. short circuit, load flow calculations, efficiency and optimisation assessments			●	

HydroHub

An initiative of TÜV NORD GROUP companies

EE ENERGY ENGINEERS GmbH
TÜV NORD GROUP
Wissenschaftspark
Munscheidstraße 14
45886 Gelsenkirchen

wasserstoff@hydrohub.de
www.hydrohub.de/en

Your contact

Dr. Carsten Gelhard
Head of the HydroHub
Mobile: +49 (0)160 888-2036
Tel.: +49 (0)201 825-2026
gelhard@energy-engineers.de

HydroHub