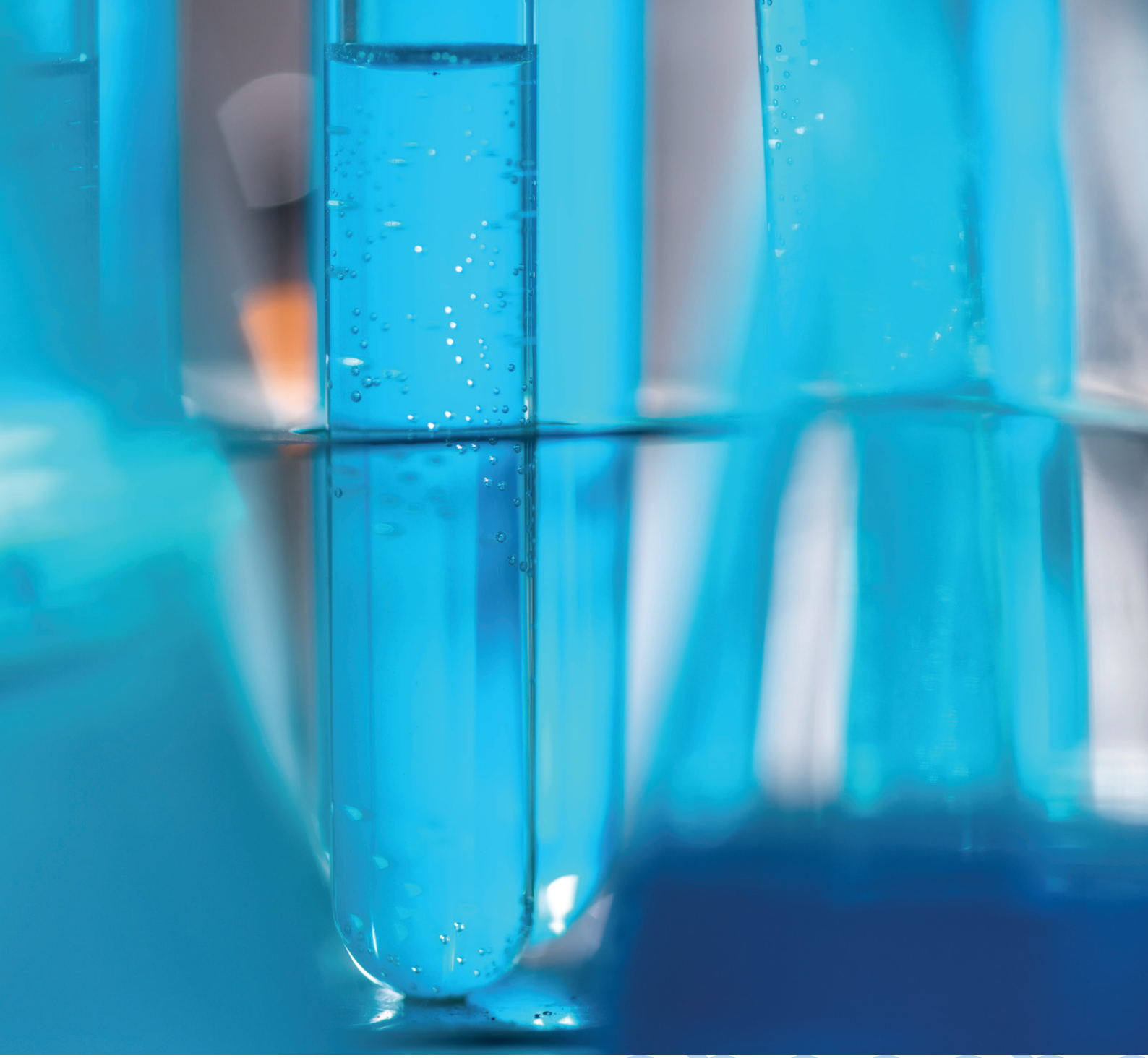

Services along the hydrogen value chain

Usage/application:

Methanol synthesis unit

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.

Methanol synthesis: turbocharging decarbonisation

With an annual production volume of over 100 million tonnes worldwide, methanol is one of the most important basic organic chemicals. As a flexible starting compound, it is used as a solvent and in the fuel sector. The gas needed for its manufacture was previously obtained from natural gas, meaning that conventional methanol synthesis is connected with high greenhouse gas emissions. Over the course of the energy transition, research is being carried out into new, highly efficient manufacturing methods by which methanol can be generated from the synthesis of green hydrogen with CO_2 or CO.

We are your partner for the research, development and market deployment of methanol synthesis – particularly with a focus on municipal and industrial actors who are aiming to make use of hydrogen. With the most modern analytical methods 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.

Green hydrogen for green methanol

If methanol is produced from green hydrogen, renewable electricity and CO_2, it makes a valuable contribution to the necessary reduction of greenhouse gas emissions and the implementation of carbon capture and utilisation strategies. To make this possible, innovative hydrogen-based power-to-liquid concepts (P2) are being tested, offering the carbon footprint-related advantages of making use of CO_2, whether produced by industrial processes, treated, contaminated or atmospheric, returning it to the cycle and even acting as a CO_2 sink when methanol is placed in storage.

Research and pilot projects

The synthesis of methanol from green hydrogen and CO_2 makes high demands of catalysts in terms of their resistance to ageing. In research facilities working on hydrogen-based methanol synthesis, catalytic processes are thus being investigated in synthesis reactors. To couple in a single plant the separate, energy-intensive stage required by conventional reactors of thermally separating the by-product, water, membrane reactors are being researched, which also offer higher methanol yields.

The goal of the first pilot projects is to gain knowledge of efficient production and scalability so that green methanol can be produced in future on a decentralised basis and at competitive prices – anywhere where cheap electricity from renewable sources and CO_2 are available, either from the combination of wind farms and waste incinerators or solar energy and biogas plants.

The beneficiary of the energy-rich, environmentally friendly and unlimitedly storable raw material produced in this way is, alongside the chemicals industry, above all the mobility sector, where green methanol can be used as an additive to e-fuels or employed in fuel cells.

Our services

We support you from the very start in considering the legal and technical conditions and will be there for you from the drawing up and execution of feasibility studies to project management. To this end, we offer you comprehensive services in the fields of consulting, engineering and training – in all phases of the project at hand:

	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 on and 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	●	●	●	●
Feasibility studies: conception and arrangement of the design parameters for the technical process, evaluation of the technical process, simulation of the technical process; determination of capital expenditure (CAPEX), operating expenditure (OPEX), emissions	●			
Civil engineering	●			
Investigation of the plant and process safety: executing HAZOP process analyses, risk assessments (work area/process-related), TRBS inspections by authorised personnel (vapour and pressure), safeguarding reporting, functional safety, SIL (safety integrity level) calculations, fire and explosion protection, safety and failure concepts, smart inspection and monitoring, revision cycle extension, legally compliant documentation	●		●	
Computer verification/structural mechanical simulations in plant construction: static and dynamic verifications to national and international regulations, analytical calculations and finite-element simulations (FEM), static/dynamic load models, mechanical models, calculation of loads (stresses), comparison with material properties for load capacity of the component, evaluation and documentation of the results as a report, damage assessment and analysis	●	●	●	
operator obligation management: conception of operator obligation management system, development of plant registers in the field of pressure vessels incl. determining test deadlines (hazardous materials), energy audits to EDL-G, introduction of energy management systems (EnMS), compliance analyses	●	●	●	●
Fire protection: Creation of fire safety concepts and assessments, specialist construction management for fire protection, fire risk assessments, fire and explosion cause determinations, risk avoidance plans	●	●	●	●

	Concept/ Planning	Production	Operation	Decommissioning/ Disposal
Explosion protection: determining the safety parameters, explosion and fire protection assessment, explosion and fire protection for machines, for operators, tests on plants requiring monitoring	●	●	●	●
Basic engineering for the technical process: Planning process technology, i.e. creating mass flow diagrams, piping and instrumentation diagrams (P&IDs), mechanical drawings of tanks, columns etc., EI&C technology, concrete construction, 3D steel and piping design, HAZOP, fire and explosion protection etc.		●		
Detailed engineering for the technical process: Detailing of the basic engineering		●		
Plant construction: acquiring equipment and subcontractors, monitoring production and delivery, monitoring assembly (concrete construction, steelwork and piping, containers, EI&C etc.), construction supervision, commissioning, training the operating personnel, performance tests, documentation		●		
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			●	
Operational optimisation of a process plan: modelling relevant chemical and physical processes for the design of reactor concepts (kinetics, heat transfer, hydrodynamic system behaviour, dispersion effects). targeted process simulation for an energy-optimised mode of operation (Linnhoff/pinch analysis), design and application of thermal and mechanical separation procedures in the distillation/rectification sectors, gas scrubbing/absorption, stripping/desorption, vacuum drying, separation, classification and sorting processes, consultation, troubleshooting, energy efficiency and optimisation			●	

HydroHub

An initiative of TÜV NORD GROUP companies

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