



Services along the hydrogen value chain

Energy generation:

Wind energy



HydroHub

H₂ 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

H₂ 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
(H₂ and CO₂)

Pressure vessels
H₂ 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)

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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.

Wind energy: global growth and perspectives for offshore

Wind energy's expansion is moving on apace across the world, with the majority of farms being built on dry land and many locations with favourable wind conditions and infrastructural connection opportunities available for connection.

In comparison with this, the offshore sector appears insignificant, making up only 4.5 % of all wind power plants (as of the end of 2019). New offshore facilities, however, today offer much greater power capacity. Considering the potential wind to be harnessed and the sizes of plants that could be realised, their efficiency and social acceptance, offshore wind could grow even more strongly in the years to come. In Germany, incentives such as the Offshore Wind Energy Act contribute to this, last amended in 2020.

As part of Germany's National Hydrogen Strategy, projects can also be subsidised that use wind energy in a cross-sectoral way, say, in climate-neutral energy supply to districts. By using wind electricity to produce green hydrogen, companies in, say, the steel and cement indus-

tries can reduce their CO₂ emissions, while refineries can lay the foundations for the production of synthetic fuels. In addition, wind farm operators can become hydrogen producers themselves. Innovative concepts are currently investigating the production of green hydrogen at sea, right in the offshore wind farm.

We are your experienced partner for the use of wind energy on land and sea, particularly with a view to designing innovative hydrogen process chains. 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.



Wind energy for the hydrogen economy

The development of the electrical grid and establishment of a hydrogen economy should contribute, among other things, to wind farms no longer needing to be shut down to avoid the overloading of the grid. Wind farm operators can benefit from investment grants under Germany's National Hydrogen Strategy, whose subsidies arise from the Renewable Energy Act (EEG).

Alongside the incorporation of electrolyzers and hydrogen storage or transport solutions on site, cross-sectoral concepts for the production and use of green hydrogen are also attractive here. Steel and petrochemicals, whose decarbonisation is only hard to achieve, are among the buyers of wind electricity with which electrolyzers can be operated.



Our services

From planning a wind farm for individual operators or cross-sectoral consortia to the dismantling of old plants, we support you with comprehensive services in the fields of consulting, engineering and training at the following 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 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	●	●	●	●
Detailed engineering for the technical process: Detailing of the basic engineering		●		
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			●	



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