Services along the hydrogen value chain

**Storage:**

# Battery storage


TÜV®

TÜV NORD GROUP

# $H_2$ competence @ TÜV NORD

## 1. Energy generation

Wind energy

## 2. $H_2$ generation

Electrolysis

Seawater desalination plants

## 3. Distribution/transport

Electrical grid

Pipelines

District heating

Intelligent networks

Pipelines

Refuelling stations/ filling systems

Tankers (lorry, train, ship)

## 4. Storage

Battery storage

Gas tanks

Cavern storage ($H_2$ and $CO_2$)

Pressure vessels

$H_2$ hybrid storage

## 5. Consumption/use

Fuel cell systems

Methanol synthesis units

Refinery

Mobility

**In every field of services, we support you in the following phases:**

Concept/planning  Production  Operation

## Concept/planning

We support you in the concept phase with comprehensive services that will give your project the security it needs in technical and legal aspects from the very start. From product design through the assessment of requirements and technical specifications to plant development and process optimisation, our specialists have the details and the desired goal in view and are equipped and prepared for your tasks with ultra-modern IT and AI instruments as well as a broad spectrum of risk analysis, certification, test and evaluation services.

## Production

With specific testing,auditing and approval services, we provide neutral and technically competent support as a notified and accredited body for manufacturers. This includes assessment and certification as a material manufacturer, obligatory for the production of certain products. Our range of services also includes the assessment of manufacturing processes, material assessments, stress tests, damage appraisal and product certifications. In addition, on top of monitoring production, we also support commissioning, assembly works and personnel instruction in production processes.

## Operation

After setup and commissioning, we help you when operations are up and running to avoid shutdowns, eliminate technical sources of danger and reduce costs with the use of software-supported maintenance systems. We take on the task of carrying out all recurring inspections and specific tests of electrical and mechanical plants and systems. We can also create risk-based maintenance plans and provide you with tailor-made strategies to reduce operational risks and increase plant safety over the long term.

# Battery storage – critical for the success of the energy and transport transition

The development of renewable energy generation demands a never-before-seen flexibility in the centralised architecture of the electricity sector. As renewable energy does not flow constantly, measures are needed to make production overhangs usable and ensure time- and weather-independent electricity supplies. Here, stationary battery storage is taking on an ever more important role. With scalable capacity and intelligent control, it is able, say, to redistribute loads, shave load peaks and to temporarily compensate for grid faults such as power plant shutdowns. In the development of mobility solutions for tomorrow, mobile battery storage is taking on a central role. Competing with fuel cell technology, but also in combination with it, pioneering drive concepts are being created with diverse opportunities for use.

We are your partner for battery-supported mobility, to make use of excess capacities in the generation of renewable energy and to ensure the grid-regulating integration of photovoltaic and wind-generated electricity. With the most modern analytical methods and competent experts, we are at your side, helping you safely plan high-performance battery storage facilities, operate them successfully and benefit from subsidies as available. Do get in touch.

# Rechargeable battery technologies

Like in consumer electronics and e-mobility, lithium-ion batteries are gaining a globally leading position in the stationary battery storage market too. With a market share of two thirds, these storage technologies provide the most common and high-performance technology for battery storage plants.

The remaining third of the market is occupied by lead, sodium-sulphur and sodium-nickel chloride batteries, redox flow cells and nickel-cadmium batteries.

# Performance

While in Europe, relatively small plants with storage capacities in the one- to two-figure MWh range are used for industrial purposes, usually in conjunction with solar plants and wind farms, Australia and the USA already have plants in the three- to four-figure range. Because of the modularity of battery storage plants, their storage capacity can be very easily extended, meaning that their capacity could soon match the level of large pumped storage plants, whose scalability is limited and very expensive.

A characteristic advantage of battery storage is its cold start-up ability, with short control and start times in the millisecond range, meaning they can have a stabilising effect on the system. Further potential exists in their integration in virtual power plants (VPPs). The pooling of several decentralised battery storage facilities and their management and intelligent control opens up new possibilities for energy companies in day-ahead and intraday trading on the balancing market.

# Areas of use and usage

Battery storage offers scalable complete solutions for reliable electricity supply – at any time or place, on industrial levels and in the home.

## Large-scale battery storage

*Potential areas of use:*

- Energy-intensive industry and agriculture
- Municipal utilities
- Energy producers (wind, solar)
- Grid operators
- Car dealerships and commercial operations with e-charging stations

*Examples of use*

- Storage of excess production capacity
- Reduction of load peaks (peak shaving)
- Covering peak loads in the minute range
- Management of consumption fees
- Optimisation of the level of self-sufficient supply
- Increasing grid stability
- Ensuring the necessary quality and flexibility in electrical grids
- Power-as-a-service concepts

## Small battery storage

*Potential areas of use:*

- Data centres, telecommunications providers
- Private households
- E-mobility

*Examples of use*

- Uninterruptible power supply
- Storage of excess energy from solar plants
- Driving electric, hybrid and hydrogen vehicles

# Our services

Fuel cells and fuel cell systems have great market potential in nearly all areas of emissions-free energy supply. With comprehensive services in the fields of testing, inspection and certification, we support manufacturers and operators in the following phases:

| | Concept / planning | Production | Operation |
|---|---|---|---|
| Inspection of concepts to current legal requirements, standards and regulations | ■ | | |
| Inspection of requirements specifications | ■ | | |
| Inspection of technical specifications | ■ | | |
| Inspection of component designs on the basis of standards, third-party requirement catalogues or customer demands | ■ | | |
| Certification of protective devices | ■ | | |
| Inspection of staggered power system protection plans, protection tests | ■ | | |
| Analysis of electrical grids | ■ | | |
| Certification of the grid connection | ■ | | |
| Certification of protective devices, inspection, safety design | ■ | | |
| Conformity assessments of electronic components/systems | ■ | | |
| Inspection of the design, construction, functioning and reliability of hoists, cranes and load handling equipment | ■ | | |
| Inspection of risk analyses to determine the potential risk of intervention by unauthorised persons | ■ | | |
| Inspection of safeguarding concepts | ■ | | |
| Inspection on determination of intervention measures by guarding/security company or police | ■ | | |

| | Concept / planning | Production | Operation |
|---|---|---|---|
| Inspection on determination of administrative security measures | ■ | | |
| Inspection commissioning and periodic inspection concepts | ■ | | |
| Testing electromagnetic compatibility | ■ | | ■ |
| McLyzer cell block design inspection | ■ | | |
| Technical due diligence | ■ | | |
| Technical, financial, legal due diligence (with external partners) | ■ | | |
| Inspection on installation and operation of alarm receiving stations | | ■ | |
| Production monitoring and auditing | | ■ | |
| Inspection and support for commissioning and assembly works | | ■ | |
| Acceptance and functional tests | | ■ | |
| Acceptance tests (commissioning, periodic inspection) of isolated grids with involvement of e.g. decentralised generator units, electrolysers and any necessary storage systems (on and offshore) | | ■ | |
| Inspection of switchgears/control cabinets to EN 61439-1 | | | ■ |
| Inspection of electrical and mechanical safeguarding systems | | | ■ |
| Recurring inspections | | | ■ |

## Your contact

Holger Keysselitz
Sales of hydrogen services
Mobile: +49 (0)160 888-5726
Tel.: +49 (0)201 825-2788
hkeysselitz@tuev-nord.de

## TÜV NORD Systems GmbH & Co. KG

Große Bahnstraße 31, 22525 Hamburg

wasserstoff@tuev-nord.de
www.tuev-nord.de/de/unternehmen/energie/wasserstoff