



thyssenkrupp
nucera

World-Leading Electrolysis Technology

www.thyssenkrupp-nucera.com

Who We Are

Driven by chemical engineering innovation, thyssenkrupp nucera pioneers high-efficiency electrolysis technology with 50+ years of experience. Throughout our journey, we have developed two strong portfolio segments that create synergies and provide innovative solutions for industrial progress and green value chains: chlor-alkali and green hydrogen.

We provide state-of-the-art electrolyzers worldwide that harness the power of solar, wind and water energy to produce hydrogen, leaving no harmful greenhouse gas emissions behind. We believe, by producing green hydrogen at a commercial scale, we enable sustainable transformation and provide our customers with access to clean, renewable energy that will last for generations to come. Safety anchors our pursuit of high-tech breakthroughs, embracing challenges with resilience.



8
regions



600+
employees worldwide

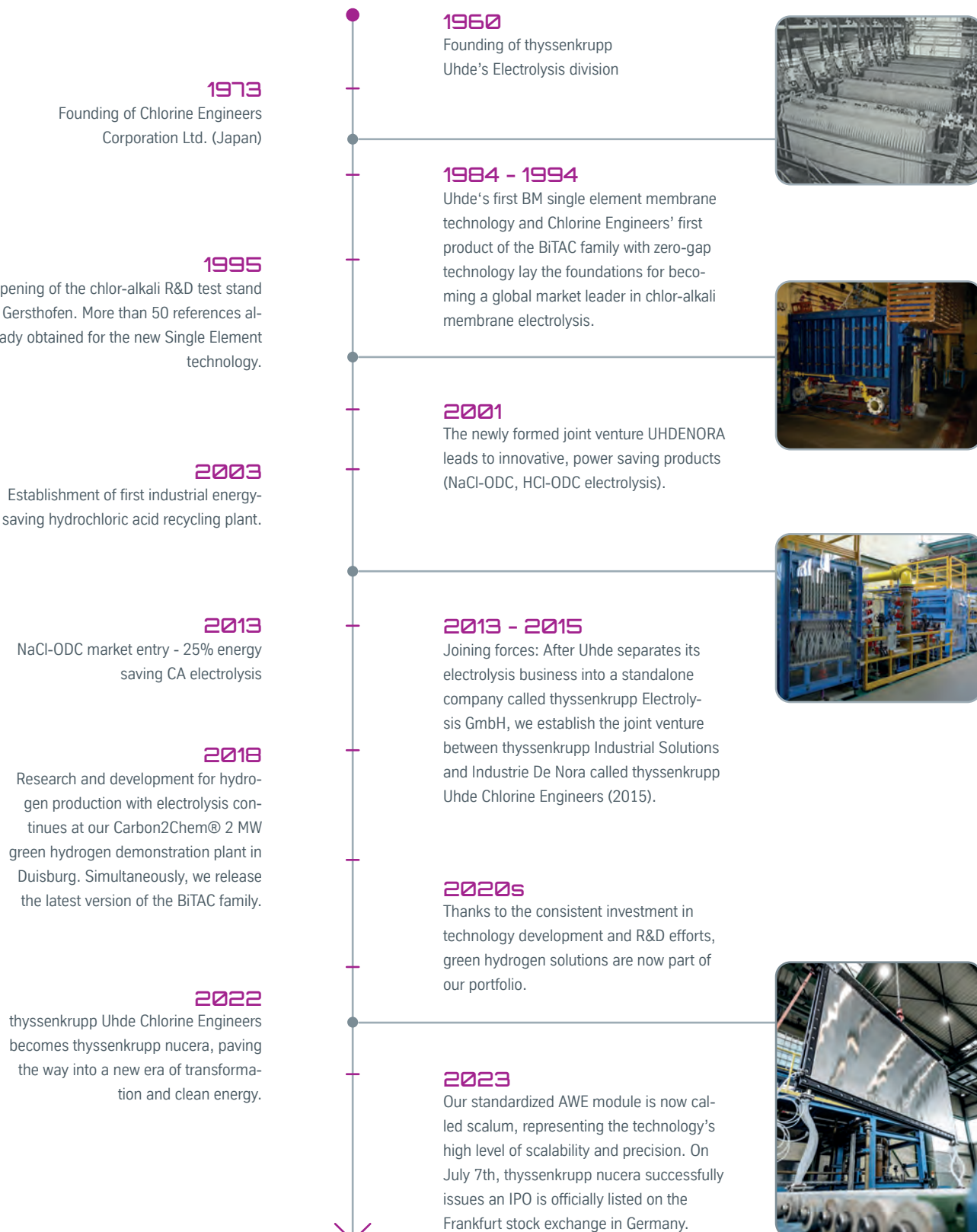


600+
successful projects



Where We Come From

With a history spanning over 60 years, we bring together the collective expertise of three renowned global leaders in the field of electrolysis: thyssenkrupp's electrolysis division in Germany, the Italian electrochemical specialist UHDENORA, and the former electrolysis unit of the Japanese Mitsui group. Today, we proudly offer cutting-edge technologies and innovative solutions for efficient chlor-alkali and green hydrogen electrolysis. Our offerings are a testament to our extensive experience and worldwide partnerships, solidifying our position as leaders in the field.



We shape the new era.

Green Hydrogen

- Green hydrogen at industrial scale based on proven track record in the chemical industry
- scalum®: efficient and reliable large-scale alkaline water electrolysis (AWE) technology

Chlor-Alkali

- More than 50 years experience in electrolysis
- Chlor-alkali solutions with integrated process solutions
- Hydrochloric acid solutions

Sustainability

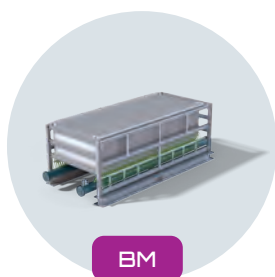
- Cell refurbishment promotes circularity and sustainability
- Continuous research and development for more efficiency
- Growing renewable energy sector at low cost
- Sustainable partnerships

Service and Digitalization

- Service approach along the entire plant lifecycle
- Digital services, engineering & consulting
- Spare parts
- Refurbishments & revamps

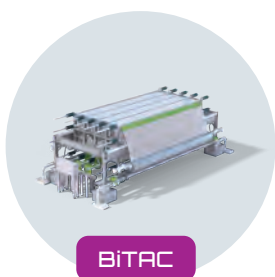
Innovative Chlor-Alkali (CA) and Hydrochloric Acid (HCl) Solutions for Industrial Progress

As a global leader in electrolysis, we have implemented projects from small facilities to large CA plants with capacities of over 800,000 mt/year of NaOH. Our well-proven CA solutions are being constantly optimized:



BM

Bipolar membrane (BM) single element technology: optimized design features and longer membrane life under high current density operation.



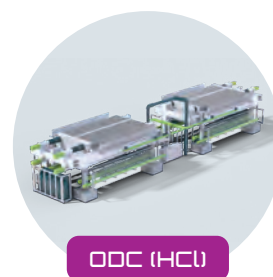
BiTAC

Bipolar ion-exchange membrane process electrolyzer (BiTAC): fast remembraning of the complete electrolyzer. All generations of the BiTAC family are compatible, so existing plants can easily be upgraded to the latest developments.



ODC (NaCl)

Oxygen-depolarized cathode electrolysis technology (ODC): reliable and well-proven, offering a higher degree of site flexibility regarding electricity and hydrogen supplies.



ODC (HCl)

Membrane electrolyzer technology using oxygen-depolarized cathode (ODC): cuts energy consumption by about 30%, reducing the indirect carbon dioxide emissions involved in production.

scalum®

Alkaline Water Electrolysis technology delivers the two vital components: speed and scale. Based on proven quality, safety, reliability, and the passion to innovate we set a benchmark: scalum®



Quality & Longevity

proven cell design
with high durability



High Performance

long-term technology
experience



Design certified

by TÜV Rheinland
to meet requirements of
chapter 4 of ISO 22734:2019



Service

global service network

Enabling Green Transformation

scalum® marks a significant milestone in our unique, long time development path. We combine about 300 high-efficiency cells into one powerful unit with a system capacity of 20 MW. scalum® is designed as a standardized modular solution that can be easily interconnected and scaled up unit by unit to match highest demands for plants up to several hundred megawatts or even gigawatts. scalum® becomes the key to ramp up our production capacity and shape the new era of clean energy – fast.

Key Benefits

- Modular, skid mounted design
- Low power consumption
- Fully automated operation possible
- Global service network
- Higher current density allows more compact footprint
- Fast dynamics suitable to renewable power sources
- Mass production & supply chain at gigawatt scale
- >1 GW electrolysis capacity p.a. expanding to 5 GW p.a.
- Leading total cost of ownership (TCO)
- Non-pressurized safety design avoids requirement of classified area

Proven Experience in Chlor-Alkali Provides Strong Technology Basis for AWE Scale-Up

Chlor-Alkali



Over 600 projects, 240,000 cell elements, >10 GW of capacity installed

- Industrial-scale installations
- A technology leader for electrolysis
- Proven supply chain of more than 1 GW cell manufacturing capacity p.a.
- Holistic life cycle services

Alkaline Water Electrolysis



Building on CA leadership

- Industrial-scale hydrogen plants
- Hydrogen as the main product
- Standardized module approach helps reduce CAPEX and delivery times
- Supply chain at multi-gigawatt scale, expanding to a 5 gigawatt supply chain



Carbon2Chem

In 2018, thyssenkrupp nucera's 2 MW green hydrogen demonstrator plant started operations at Carbon2Chem in Duisburg. It can run both at permanent full load as well as with rapidly changing load profiles based on the electricity market for high-quality primary control power, thus simulating the volatile availability of renewable energies, for example from wind or solar power.

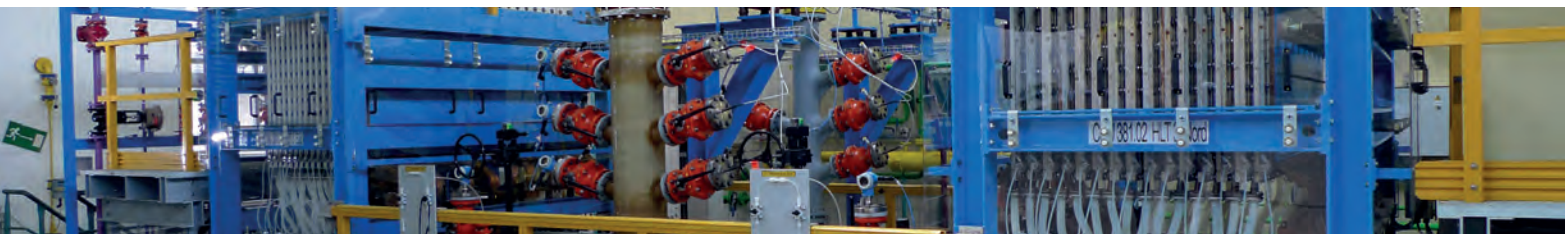
At Carbon2Chem, we continuously test innovative materials and components to further optimize and advance our alkaline water electrolysis (AWE) technology. Our dedicated product development roadmap aims at 2nd generation electrolysis design with advanced next generation architecture for improved TCO, towards automatized serial production and supply chain at scale.



Gersthofen Test Facility

We aim to continuously improve our technologies towards the highest possible availability, long service life and low electrical power consumption. By experimenting, testing, and optimizing our technologies, we secure the control loop between suppliers and end customers, and can work on customized solutions. thyssenkrupp nucera operates two test facilities each for NaCl and HCl-ODC electrolysis in production scale at the CABB site in Gersthofen.

Additionally, we operate two smaller test facilities, each for NaCl-ODC and NaCl electrolysis in full-scale height. With these facilities, we can develop and lift optimization potential for our electrolysis technologies, for example regarding specific electrical power consumption. All application cases tested in Gersthofen can be transferred without any limitation to industrial scale and thus directly to the customers' plants.





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