



Decentralized  
production

Grid  
injection

Industry

Mobility

Energy systems  
for buildings

# Optimizing the electrical eco-system for green hydrogen production

POWER SYSTEM EXPERTISE • TECHNOLOGY SOLUTIONS • GLOBAL REACH • LOCAL SERVICING



## Optimizing the production of green hydrogen

Hydrogen could account for up to 12% of global energy use by 2050.\* And green hydrogen, which is produced using renewable energy sources, could play a significant role in reducing the world's dependence on fossil fuels, while increasing supply resilience and contributing to the reduction of carbon emissions.

But for this much-needed transition to take place, the green hydrogen industry needs to be able to:

- **Reduce cost** by standardising and simplifying manufacturing and design to allow for industrialization and scale-up.
- **Improve efficiency** to reduce the amount of electricity required to produce one unit of hydrogen.
- **Increase durability** to lengthen equipment lifetime – growing the return on investment by producing hydrogen for longer.

Although renewable energy capacity is about to dramatically increase over the coming years, the amount being generated by renewable sources today is insufficient to power the world's transition to the green economy. Industry urgently needs to optimize the use of renewable energy already available, as well as seek new ways to optimize costs and efficiencies in response to the increasingly volatile energy market.

Fluctuations in the availability of renewable energy sources (such as solar, wind or hydro) are hard to forecast, and make consistent hydrogen production challenging. This is generally solved by oversizing, but this is an inefficient practice that increases the level of CAPEX and OPEX needed to secure a clean energy source.

\*Source: International Renewable Energy Agency, 2022

## Optimizing what you see



## Control what you don't see

Unplanned downtime and service cost

Downtime and energy availability

EHS

Energy losses

Real system performance vs requirements



Reducing the energy requirement-to-production ratio is a much better use of the available natural resources, reducing costs while increasing return on investment. One route to achieving this is to optimize the electrical power ecosystem.

However, to create flexible hydrogen production plant, where operation can be dynamically controlled and optimised involves multiple complexities and challenges, especially when scaling up production. This is where the right power conversion system is key.

**Scaling up power cells into the hundreds or even thousands turns a simple electrical infrastructure into an entire ecosystem, introducing the need for expert knowledge and experience to optimize performance and avoid failure problems.**

A deep understanding of hydrogen production processes and technologies – and their limitations and constraints – is a prerequisite for designing the right electrical ecosystem to power them.

Dimensioning, design, execution, investment and operation cost all need to be carefully considered to deliver the most efficient, reliable and economical technical solution for large-scale installations. Building this level of optimization into the design then leverages resources to optimize cost, CAPEX and OPEX.

This expertise needs to extend to awareness of the ‘big picture’ geopolitical conditions, being familiar with local and regional regulations (and their impact) additional to global standards, and awareness of any local incentives that may be running.

**This is the added value that KraffPowercon delivers for the hydrogen industry.**

**We design for each market and each installation, ensuring each solution is cost-efficient, reliable and optimized to your needs.**

“Efficient and effective power supply is crucial to the hydrogen installations we’re delivering. Partnering with the KraffPowercon team gives us access to fantastic power system expertise, as well as technology and support for planning, installation, commissioning and servicing our hydrogen installations.”  
- Nel Hydrogen

# We integrate and deliver all your electrical power requirements



# KraftPowercon rectifiers and power systems for electrolysis and hydrogen production, processing and application



## PowerKraft™

Robust and reliable, the high-efficiency DC power supply for large hydrogen installations that is based on solid-state thyristor technology.



## PowerPack™ containerised solution

The integrated power system for green hydrogen production. It is built into a standard ISO 20' /40' container for turnkey deployment, and factory-configured to your location and requirements.



## FlexKraft

A scalable, switch mode DC power supply providing flexibility and high efficiency for small scale applications within the hydrogen value chain.



## EC Kraft

A modular, switch mode DC rectifier, with IP44 protection for harsh environments – designed for exceptional reliability in off-shore installations.

### CUSTOMER CHALLENGE SOLVED

## Supporting energy availability for a 24/7 hydrogen production schedule

Our engineers designed a modular selective protection scheme to optimize energy use in the event of an electrical fault (such as with a fan or thyristor), enabling hydrogen production to continue at reduced capacity rather than stopping altogether. We also upgraded the mechanical design to reduce downtime during component replacement.

### Result:

Uninterrupted operation, with an electrical system that is easy to maintain and troubleshoot, reducing costly downtime and production losses.





CUSTOMER CHALLENGE SOLVED

**Minimising installation footprint while meeting stringent power requirements**

KraftPowercon designed a compact double-deck containerised solution, with an SCR power system producing 1.5% ripple and less than 5% harmonic distortion, running at an overall system efficiency of 94%.

**Result:**

Land use optimized, compliance with strict grid requirements, reduced energy losses to increase reliability and cost efficiency.



Part of our 20,000m<sup>2</sup>+ global production footprint, our new 3,500m<sup>2</sup> production facility is specially equipped to design and manufacture KraftPowercon hydrogen power solutions.



Our robust manufacturing supply chain enables us to scale up production and drive down costs through increased volume.

# The advantages of partnering with KraftPowercon

**Efficiency, power factor, harmonic distortion, ripple...  
we enable you to address and accommodate all your i  
nput or output power quality requirements and constraints.**

We navigate the complexities of design to deliver optimized power supply solutions that bring lifecycle costs down and enhance efficiency.

- Over 50 years of experience in powering hydrogen production
- Technical power supply solutions that are reliable and economical
- Ensuring safety and compliance through our expertise in connecting grid and customer

Our engineers and designers consider operational factors, such as maintenance requirements and integration with your complete value chain.

We don't focus on quick returns or easy fixes – our priority is optimizing and supporting electrical ecosystems that will serve your needs and delivers cost benefits over the long term.

## **Global network, local services**

We support you with engineering from our global network and ensure quick response from local service personnel. We secure your most critical components in case of emergencies.

*We won't let you down*

Make KraftPowercon your provider partner for technology solutions, power system expertise and regular servicing.



# Powering a better world

KraftPowercon offers solutions, products, services – and drives innovation – within industrial power conversion. We create value for our customers by ensuring efficient, green, and reliable processes that meet the demand of today and tomorrow.

Headquartered in Sweden, KraftPowercon was founded in 1935 and now has production facilities in Sweden, China and India. We provide global sales, service and support.