

AKROS



ENERGY IN SALT

Hydrogen storage at
industrial scale,
without compromise.

A salt-based hydrogen storage system with high round-trip efficiency, zero self-discharge and the lowest levelised cost for storage durations beyond a few days.

\$ 1 / kg H₂

LEVELIZED COST OF STORAGE*

75%

ROUND-TRIP EFFICIENCY

Zero

SELF-DISCHARGE SEASONAL-READY

0 – 100%

SEAMLESS PARTIAL LOAD

*LCOS reference figure of ~\$1 / kg H₂ is calculated for the 100 kg H₂ / h configuration (seasonal storage with 1 cycle per year, 25-year capex amortisation). H₂ output meets industrial-grade purity for refinery, steel and combustion use; fuel-cell-grade applications require additional purification downstream.

EXECUTIVE SUMMARY

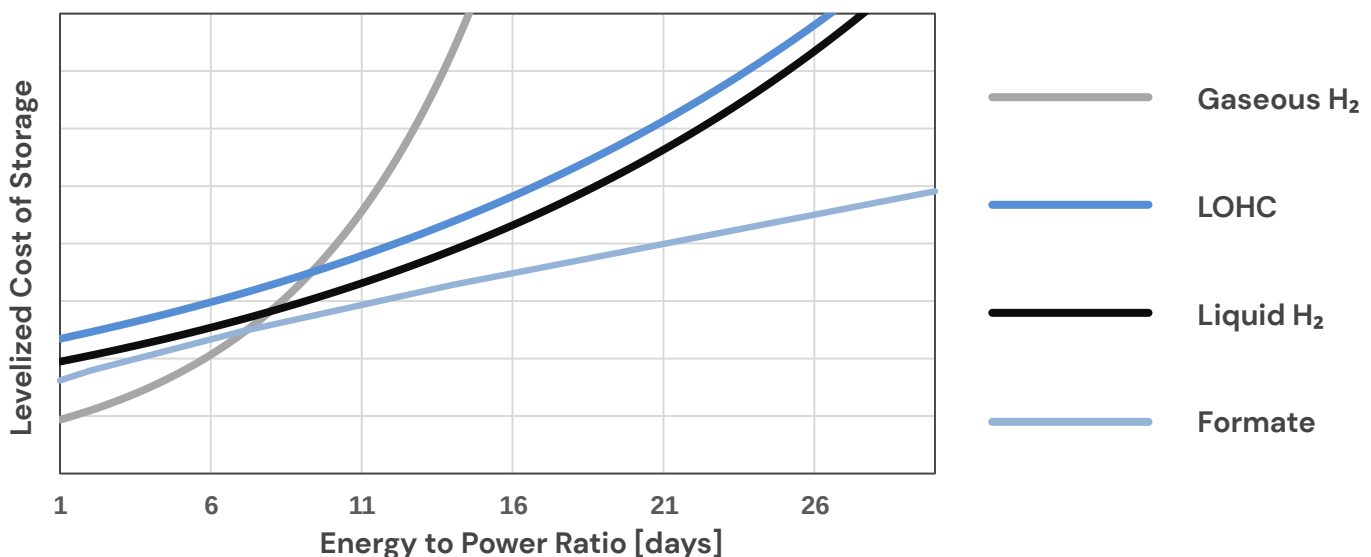
The rapid scale-up of renewable hydrogen creates a growing need for large-scale, long-duration storage that is safe, efficient and economically viable. Salt caverns are geography-bound; high-pressure tanks and liquefaction face well-known cost and density limits; alternative chemical carriers carry significant safety, energy or infrastructure burdens.

AKROS Energy GmbH delivers a salt-based hydrogen storage solution that operates at mild conditions (60 °C, ≤ 30 bar), has no self-discharge, and offers the lowest levelised cost of storage for durations beyond approximately seven days. Built from abundant, non-toxic materials and deployable at sites without geological constraints, it is purpose-built for industrial supply, renewable integration and grid firming.

Key facts

Application	Long-duration & seasonal storage
Carrier (loaded)	Potassium formate
Carrier (unloaded)	Potassium bicarbonate
Process conditions	60 °C @ 0 – 30 bar
Round-trip efficiency	75%
Self-discharge	None
LCOS	~ \$ 1 / kg H₂
Capacity range	3 kg → 3 t H₂ / h
Partial-load behavior	0 – 100% seamless
Footprint	Compact
First commercial plant	2027

LCOS by storage duration: **salt wins beyond ~7 days.**



Levelised cost of storage (\$ / kg H₂) versus energy-to-power ratio (storage duration, days). The salt-based carrier is the lowest-cost option for storage durations beyond approximately seven days, with an LCOS that scales gently with duration — making it uniquely suited to long-duration and seasonal storage applications. Source: Comparison and Cost Analysis of Promising Hydrogen Storage Technologies for Long Term Storage in South Africa.

The storage challenge.

As hydrogen becomes a pillar of decarbonised energy systems, storage requirements extend far beyond short-term balancing; to days, weeks and entire seasons.

Long-duration storage must combine:

- Large capacity at moderate cost
- High round-trip efficiency
- Negligible self-discharge over weeks and months
- Geographic flexibility; independent of salt caverns or specific geology
- Inherent safety and straightforward permitting

The AKROS solution.

Hydrogen is bound at the storage site through catalytic hydrogenation of potassium bicarbonate (KHCO_3) into potassium formate (KCOOH). The loaded salt is stable, non-toxic and stored indefinitely without losses, in tanks scaled to project requirements.

On demand, the reaction is reversed at 60 °C to release hydrogen; at industrial-grade purity suitable for refining, steel, chemicals and combustion applications. Heat input for the release reaction is provided by integrated electric heating or by waste heat where available, optimising overall system efficiency.

Where the technology applies.

Industrial supply





Buffer storage for refineries, steel and chemical plants; providing firm, on-demand industrial hydrogen supply decoupled from intermittent renewable production.

Renewable integration

Long-duration and seasonal storage at solar and wind hydrogen production sites, enabling firm capacity from variable generation.

Hydrogen hubs

Large-scale storage for hydrogen hubs, energy parks and regions without access to underground salt caverns or other geological storage options.

CARRIER COMPARISON	Formate	Liquid H ₂	Ammonia	LOHC (DBT)
Energy consumption for storage (kWh / kg H ₂)	 ~8	 ~13	 ~17	 ~15
Process parameters	60 °C 0 – 30 bar	- 260 °C	400 – 500 °C 100 – 300 bar	300 °C 0 – 50 bar
H ₂ Content	kg H ₂ / t kg H ₂ / m ³	1,000 71	176 121	62 54
Shipping Costs (\$ / kg H ₂)	0.6	2.1	1.4	1.3

Sources: Politecnico di Milano (2024), Roland Berger (2021). AKROS technology delivers the lowest energy consumption, lowest delivered cost, mildest process conditions and highest safety profile among the four leading chemical hydrogen carriers.

Technology maturity & deployment roadmap

TRL 6 → 7

Industrial pilot plant inaugurated May 2026 in Laage, Germany

Industry partners

Evonik and Siemens — long-term partners for technology scale-up

First commercial plant

Targeted for 2027 at 100 kg H₂ / h capacity (FOAK)

Generation 1

3 t H₂ / h nameplate capacity per plant

About AKROS Energy. AKROS Energy GmbH develops safe, efficient and cost-effective hydrogen storage and transport solutions based on salt as a low-cost carrier medium. The technology supports the reliable integration of renewable energy into industrial and energy systems. AKROS is a wholly owned subsidiary of H2APEX, headquartered in Rostock-Laage, Germany.

Discuss your project with us.

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