AKROS

Energy in Salt – Efficient & Safe

THE PROBLEM

Renewables are cheaper than ever

Disconnect between energy production and consumption:

- Timely
- Spatially

Large-scale energy storage still too costly

THE SOLUTION

SALT AS ENERGY CARRIER

Potassium Bicarbonate

Unloaded Salt

- Baking soda
- Fire extinguishers

Reversible Loading/Unloading

Potassium Formate

Loaded Salt

- De-icing Agent
- Drilling fluid

Cheap and Available

Super Safe

Not toxic, flammable or explosive

Easy Handling

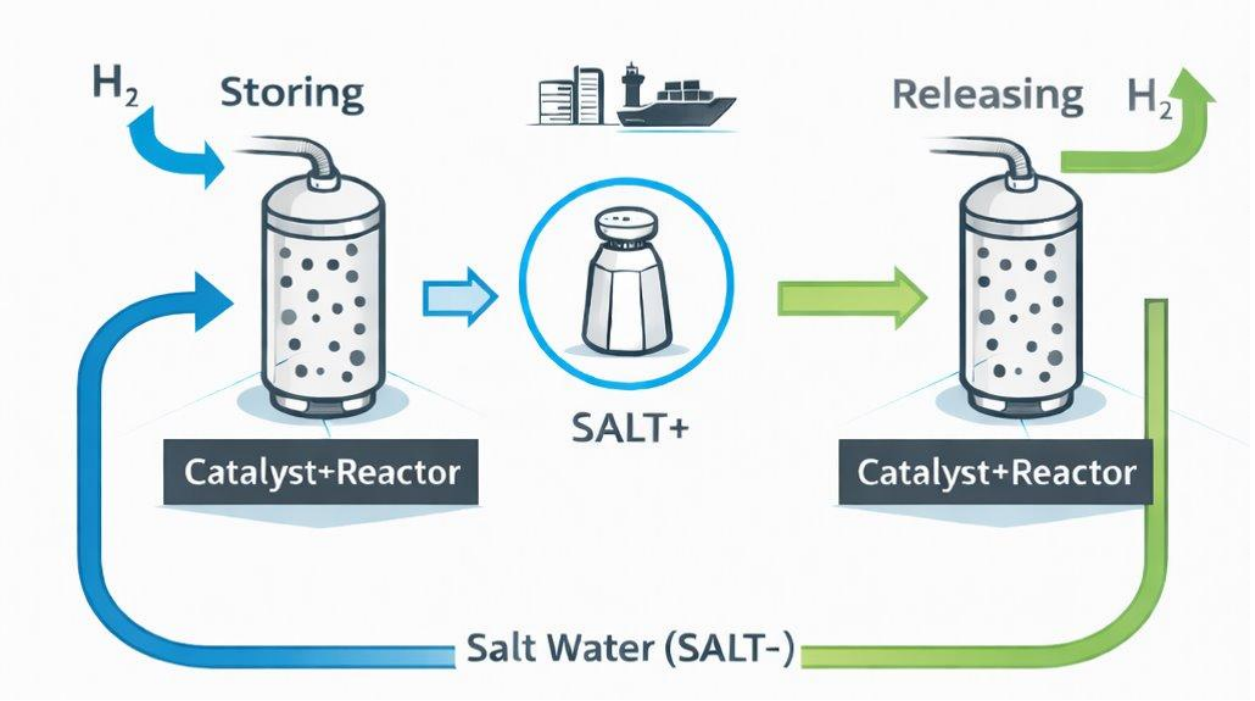
HOW IT WORKS

AKROS STORAGE TECHNOLOGY

- **H2-gas** is absorbed in and released from **saltwater solution** using AKROS's proprietary **Catalyst+Reactor System**
- Loaded Salt (SALT+) is suitable for **storage and transport** in both **liquid form** (saltwater) and **crystalline form**
- Chemical reaction:

$$KHCO_3 + H_2 \rightleftharpoons KHCO_2 + H_2O$$

Bicarbonate *Formate*



Innovation = Catalyst
that unlocks the reaction

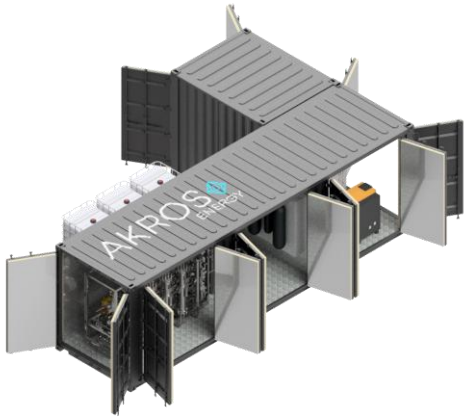
77 % Storage Efficiency
2x compared to Ammonia

AKROS HYDROGEN STORAGE PLANT

SCALING SAFE, EFFICIENT H_2-STORAGE FOR REAL-WORLD DEPLOYMENT

Lab scale demonstrator

in operation



Pilot Plant (3 kgH_2/h)

in construction

FOAK plant (100 kgH_2/h)

in negotiation

Extremely Efficient
Low pressure and temperature

Ultra Scalable
Off-the-shelf components

Cheap
Lowest levelized cost of storage

Fast
Easy permitting, fast construction

1: Hydrogen Transportation | The key to unlocking the clean hydrogen economy , Roland Berger, 2021 link
2: Green H2 Transport through LH2, NH3 and LOHC, Politecnico Milano, 2024 link

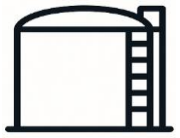
H2-CARRIER COMPARED

LOWEST COST AND HIGHEST SAFETY WITH AKROS TECHNOLOGY

	Formate	Liquid H2	Ammonia	LOHC (DBT)
				
Energy consumption for storage[1] (kWh/kgH_2)	**8.4**	12.6	16.9	15.5
Process parameters[1]	**60 °C** **0 – 30 bar**	- 260 °C	400 – 500 °C 100 – 300 bar	300 °C 0 – 50 bar
H_2 Content[1] weight %	**2.4 %**	100 %	17.6 %	6.2 %
kgH_2/m^3	**45.5**	70.8	121.0	54.0
Levelized Cost of Storage[2] ($/kgH_2$)	**3,90**	9,46	6,09	4,71
Shipping Costs[2] ($/kgH_2$)	**0,6** *bulk carrier/food tankers*	2,1 *Cryogenic ships*	1,4 *Small, expensive ships*	1,3 *Oil tankers*

APPLICATIONS

A UNIVERSAL HYDROGEN CARRIER FOR STORAGE & SHIPPING



ENERGY STORAGE

LONG DURATION ENERGY STORAGE

- **Industrial** (Steel, Refineries, Chemistry): Back-up supply and renewable balancing
- **Grid Connected**: Renewable Energy Seasonal Storage or National Strategic Reserves
- **Power-to-X**: H2 and CO2 buffering in the production of sustainable fuels

Cheapest on-site H_2-Storage

Scales most cost-effectively

Combined feedstock buffer

ENERGY TRANSPORTATION

USE EXISTING INFRASTRUCTURE

- **Ships** (bulk carrier / food tankers)
- **Rail** (domestic transport)
- **Pipeline** (for SALT water)

Cheap ships/railcars/ pipelines

Cheap local terminals

Refineries: ExxonMobil, bp, Chevron, Shell

Steel: Nippon Steel, TATA, ArcelorMittal

Chemicals: BASF, LG Chem, SABIC

National Energy Champions: TEPCO, RWE, NextEra Energy, ENGIE, Petrobras, KEPCO

Producers and Technology Provider: HIF, Infinium, TEN Technip Energies, norsk e-fuel, TOPSOE, Honeywell UOP

Energy Exporters: Saudi Aramco, ExxonMobil, Shell, Petrobras, ADNOC

Maritime Transport Pure Players: International Seaways, Inc., COSCO Shipping, Evergreen

Tank Terminal Operators: Vopak, Kinder Morgan, Stolt-Nielsen, Oiltanking

„(SALT)WATER WILL BE THE COAL OF THE FUTURE.“

Jules Verne, 1870
adapted by AKROS

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