

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



*Cheap and Available*

*Reversible  
Loading/Unloading*



### Potassium Formate

#### Loaded Salt

- De-icing Agent
- Drilling fluid



*Easy Handling*

*Super Safe*

Not toxic, flammable or explosive

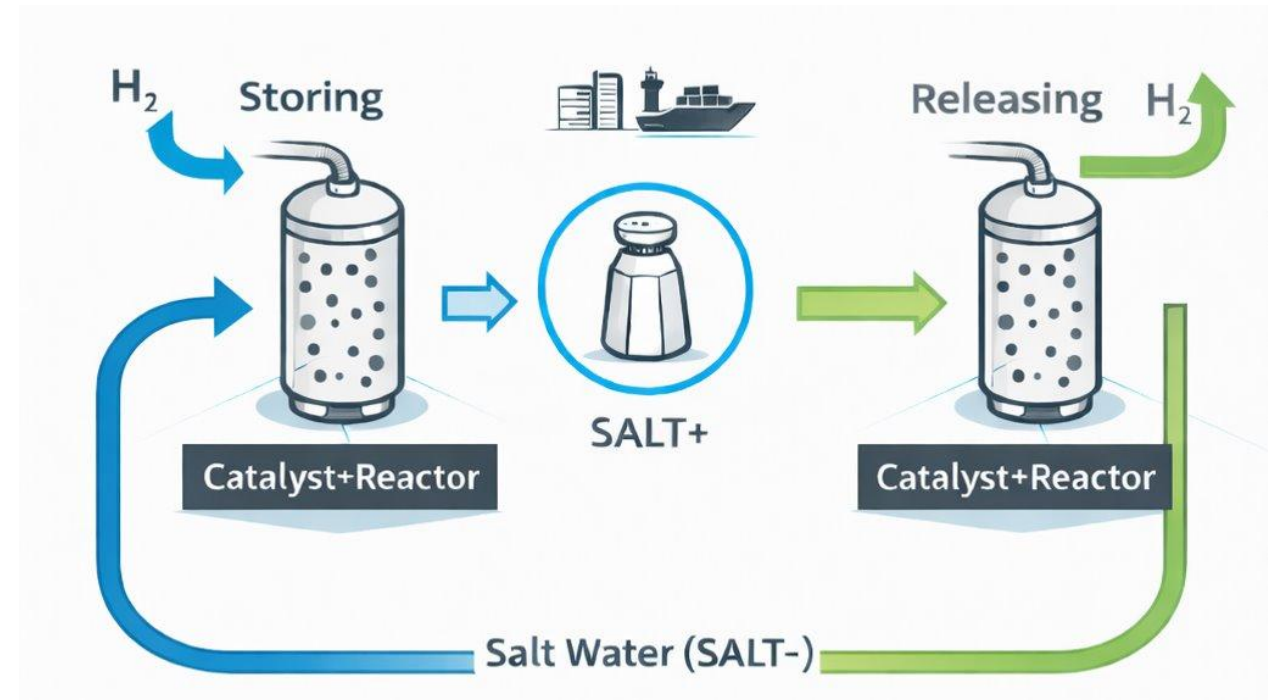
# HOW IT WORKS

## AKROS STORAGE TECHNOLOGY

- H<sub>2</sub>-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:



**Innovation = Catalyst**  
that unlocks the reaction



**77% Storage Efficiency**  
2x compared to Ammonia

# AKROS HYDROGEN STORAGE PLANT

SCALING SAFE, EFFICIENT H<sub>2</sub>-STORAGE FOR REAL-WORLD DEPLOYMENT



Lab scale demonstrator

*in operation*



Pilot Plant  
(3 kgH<sub>2</sub>/h)

*in construction*



FOAK plant  
(100 kgH<sub>2</sub>/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

# H2-CARRIER COMPARED

## LOWEST COST AND HIGHEST SAFETY WITH AKROS TECHNOLOGY

	Formate	Liquid H2	Ammonia	LOHC (DBT)
Energy consumption for storage <sup>1</sup> (kWh/kgH <sub>2</sub> )	 8,4	 12,6	 16,9	 15,5
Process parameters <sup>1</sup>	60 °C 0 – 30 bar	- 260 °C	400 – 500 °C 100 – 300 bar	300 °C 0 – 50 bar
H <sub>2</sub> Content <sup>1</sup> (kgH <sub>2</sub> )	2,4 /kg 45,5 /m <sup>3</sup>	1 /kg 70,8 /m <sup>3</sup>	17,6 /kg 121,0 /m <sup>3</sup>	6,5 /kg 65,7 /m <sup>3</sup>
Levelized Cost of Storage <sup>2</sup> (\$/kgH <sub>2</sub> )	3,90	9,46	6,09	4,71
Shipping Costs <sup>2</sup> (\$/kgH <sub>2</sub> )	0,6 <i>bulk carrier/food tankers</i>	2,1 <i>Cryogenic ships</i>	1,4 <i>Small, expensive ships</i>	1,3 <i>Oil tankers</i>

# 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:** H<sub>2</sub> and CO<sub>2</sub> buffering in the production of sustainable fuels

*Cheapest on-site H<sub>2</sub>-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*

<b>Refineries</b> ExxonMobil bp Chevron Shell	<b>Steel</b> NIPPON STEEL TATA ArcelorMittal	<b>Chemicals</b> BASF LG Chem سابك sabic
<b>National Energy Champions</b> TEPCO RWE ENGIE BR PETROBRAS KEPCO NEXTera ENERGY		
<b>Producers and Technology Provider</b> HIF INFINIUM T.EN TECHNIP ENERGIES norsk e-fuel TOPSOE Honeywell UOP		
<b>Energy Exporters</b> أرامكو السعودية saudi aramco ExxonMobil Shell BR PETROBRAS ADNOC	<b>Maritime Transport Pure Players</b> International Seaways, Inc. COSCO SHIPPING EVERGREEN	<b>Tank Terminal Operators</b> 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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