AKROS

AN H2APEX COMPANY

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Salt as an Energy Carrier

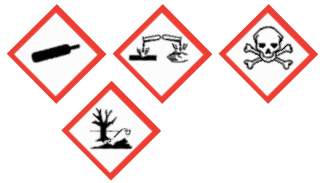
$$KHCO_3 + H_2 \rightleftharpoons KHCO_2 + H_2O$$

Bicarbonate-Formate Cycle for Hydrogen Storage

$KHCO_3$: Potassium Bicarbonate (SALT-)

$KHCO_2$: Potassium Formate (SALT+)

Hydrogen storage materials compared

	Formate	Liquid H2	Ammonia	LOHC
				
Storage efficiency (round-trip)	**77%**	63%	30%	42%
Process parameters	**60 °C** **0 – 30 bar**	- 260 °C	400 – 500 °C 100 – 300 bar	300 °C 0 – 50 bar
H_2 Content (wt%)	**2,4%**	100%	17,6%	6,5%
H2 Content (kg/m^3)	**45,5**	70,8	121,0	65,7

Highest efficiency, lowest handling requirements

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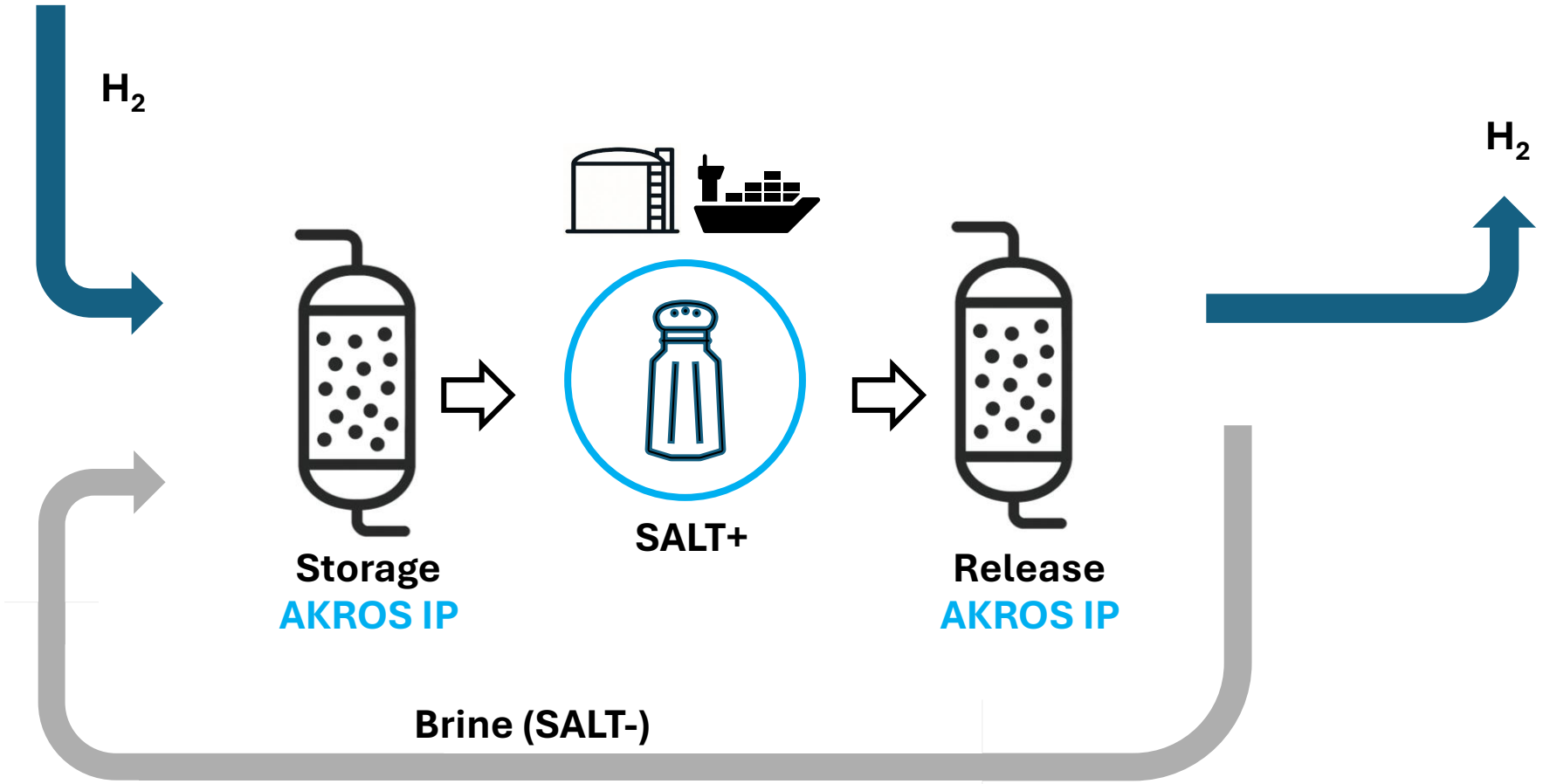
The Process



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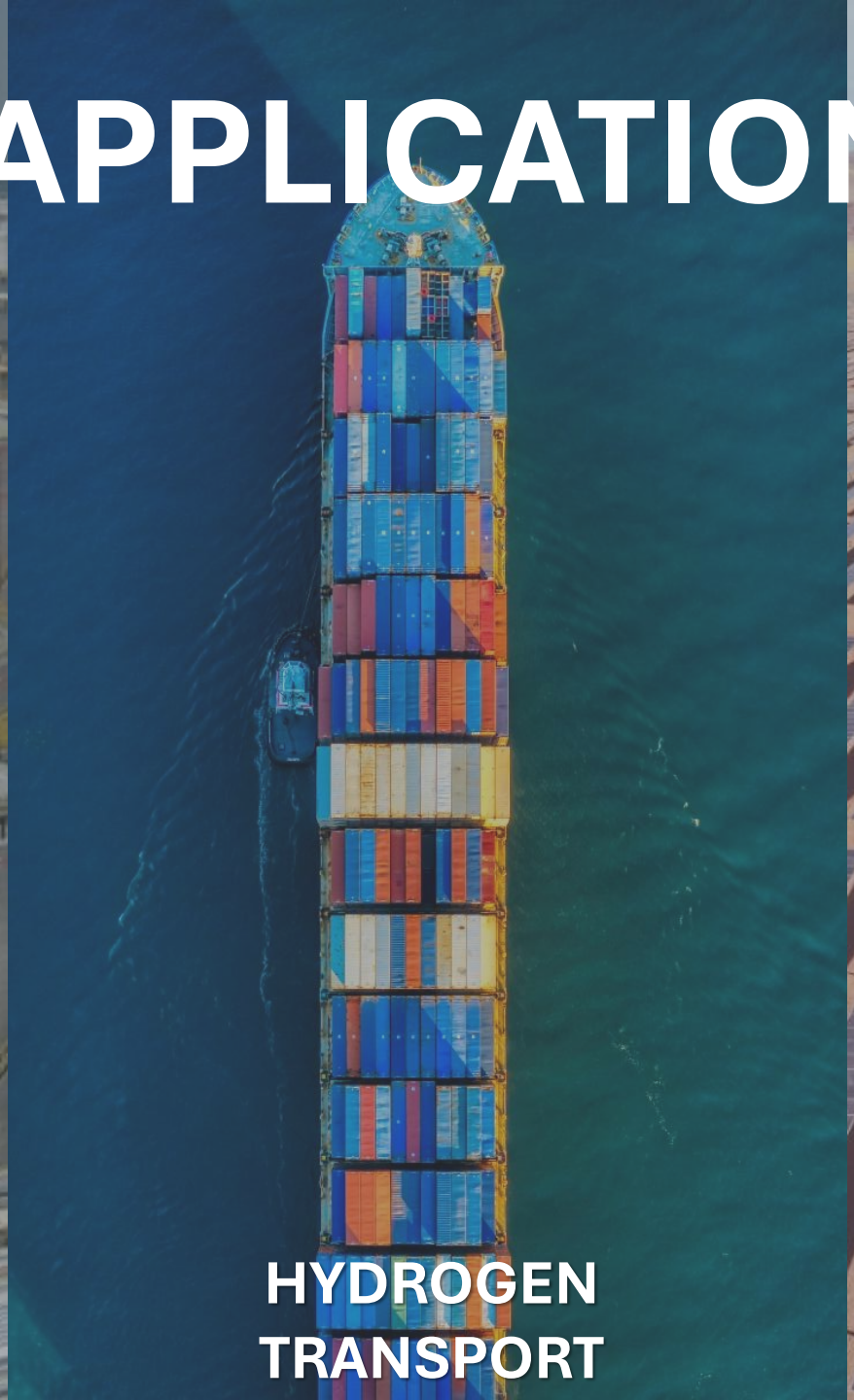
AREAS OF APPLICATION

STATIONARY HYDROGEN STORAGE



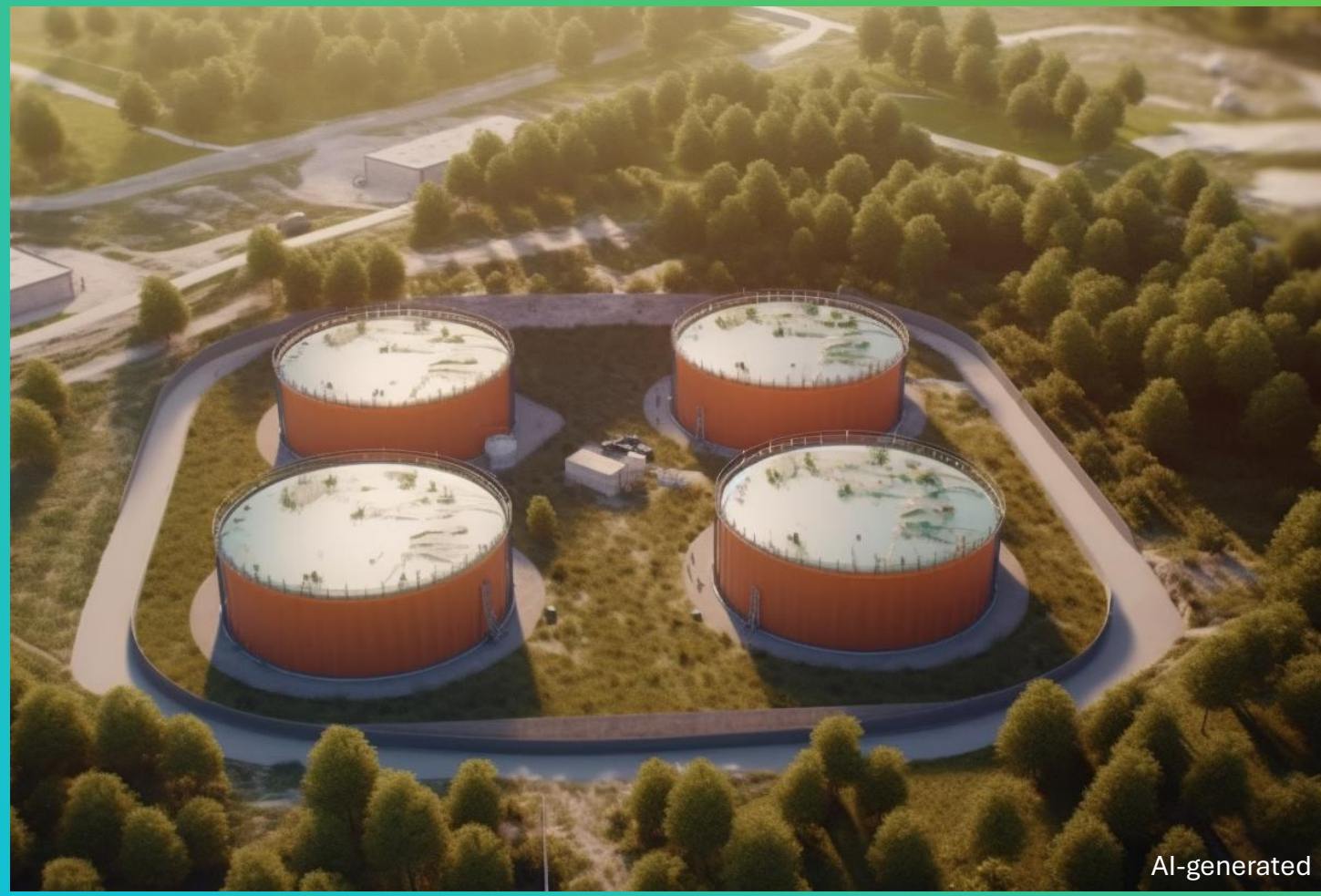
HYDROGEN TRANSPORT

PTX Feedstock Normalization

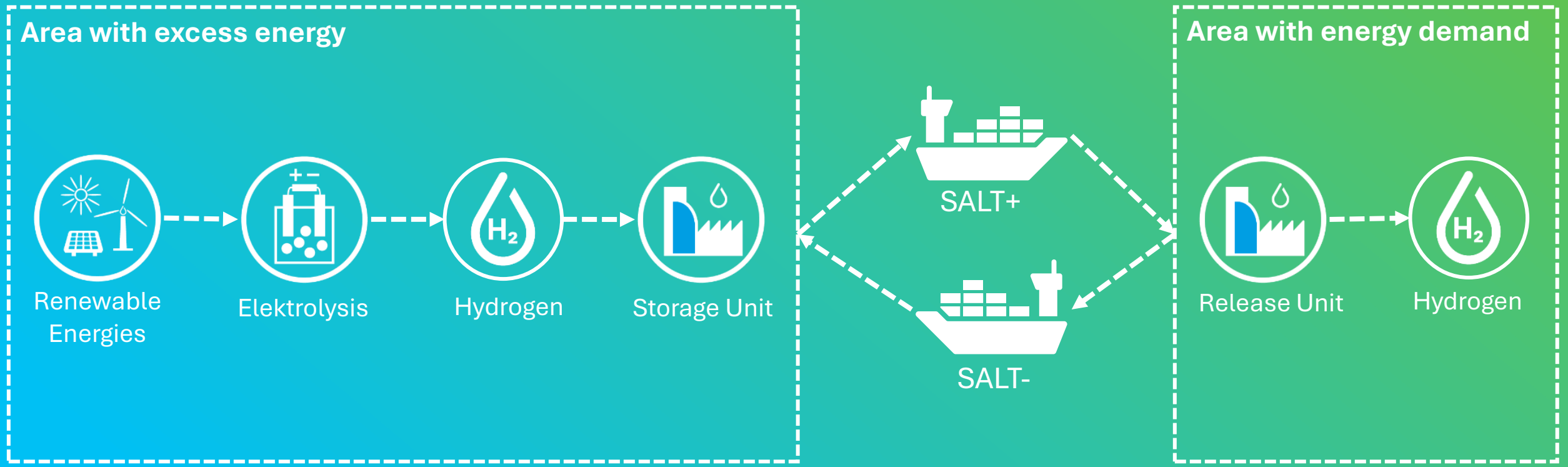
USE CASE 1: STATIONARY STORAGE

H_2 ➡ 🔄 ➡ H_2

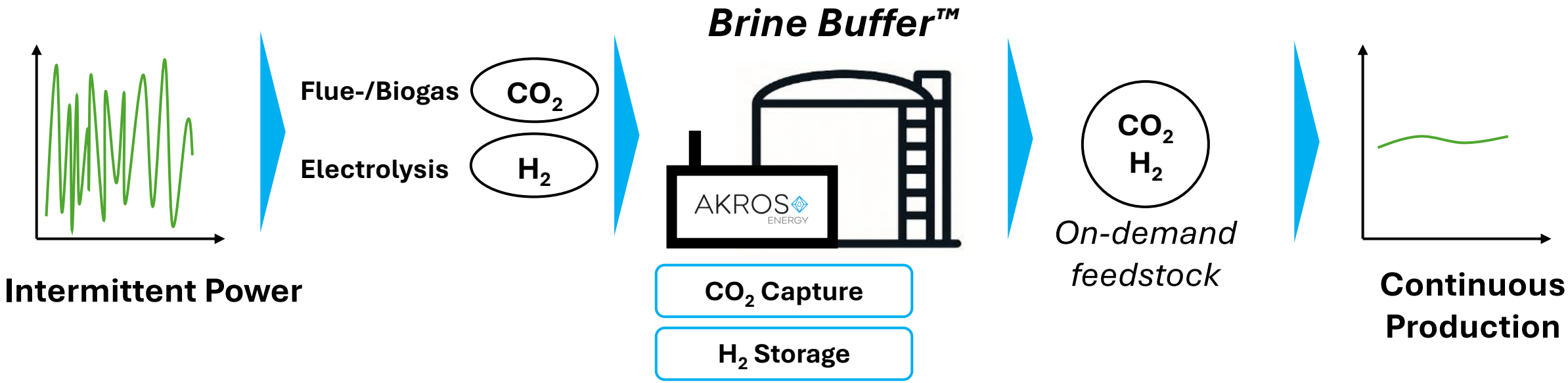
- Long-term energy storage (> 1 week)
- Highly efficient for maximum energy conservation
- High acceptance due to totally safe technology



USE CASE 2: GLOBAL HYDROGEN TRANSPORT



USE CASE 3:
PTX FEEDSTOCK NORMALIZATION



Cut renewable feedstock costs by

(A) Turning intermittency into continuous feedstock flows

(B) Integrating CO_2 capturing and H_2 buffering into one process

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Markets

Electrolysis
$H_2O \rightarrow 2H_2 + ½\ O_2$

CO_2 Capture

H_2-Supply Chains

H_2

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H_2 + CO_2

Green Molecules

H_2-Storage
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Ammonia Synthesis
$½\ N_2 + {}^3/_2\ H_2 \rightarrow NH_3$

Methanation
$CO_2 + 4H_2 \rightarrow CH_4 + 2H_2O$

Methanol Synthesis
$CO_2 + 3H_2 \rightarrow CH_3OH$

Synthesis Gas
e.g. RWGS

Fischer-Tropsch
$CO + 2H_2 \rightarrow$ wax

Hydrogen Offtake

Chemicals

Materials

Fuels

Out-of-scope

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Timeline

H2APEX → AKROS

Research Partnership with Katalysis LIKAT

Partnership for industrial catalyst production EVONIK Leading Beyond Chemistry

€950k in public grants secured

Equity financing

First customers signed

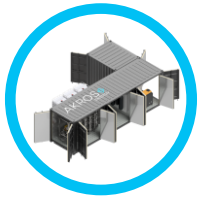
10 FTE 20 FTE

2022 2023 2024 2025 2026 2027

TRL 5

Lab scale demonstrator

Technology patented



TRL 6

100kW pilot plant

TRL 7

FOAK plant (3 MW)

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THANKS