Hydrogenious LOHC

LOHC Technology

Carrying the new energy world.
Handling hydrogen as an oil.

25.01.2023 | Rafael Schmidt

01

About us

Established in 2013, we're the global leading technology pioneer for LOHC

Hydrogenious LOHC

Investors

APVentures ADVANCE & PIONEER · ANGLO PLATINUM · Vopak · covestro

HYUNDAI · Chevron · Jera Energy for a New Era · Pavilion Capital

TEMASEK · Mitsubishi Corporation · Winkelmann Group

Key partners

Østensjø Rederi · MAN Energy Solutions

FRAMES · BILFINGER

EASTMAN · ARKEMA

CLARIANT

Technology cooperation partners

FAU Friedrich-Alexander-Universität Erlangen-Nürnberg · HI ERN Helmholtz Institute Erlangen-Nürnberg part of Forschungszentrum Jülich · HC·H2 Helmholtz-Cluster Wasserstoff
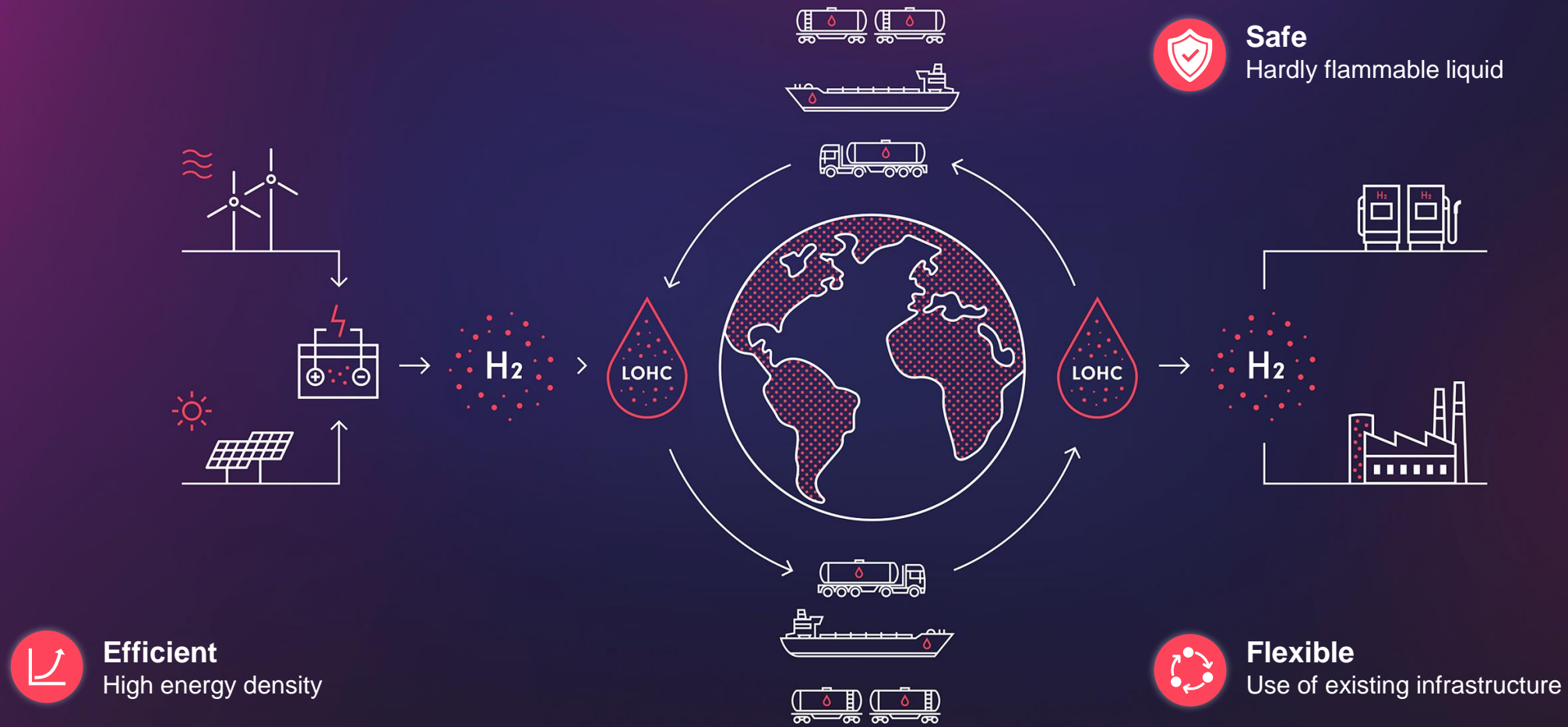
>180 employees

>55 patent families

>80 mn investor funding

LOHC technology leverages existing liquid-fuel infrastructure by transporting hydrogen as a liquid at ambient conditions

Safe
Hardly flammable liquid

Flexible
Use of existing infrastructure

Efficient
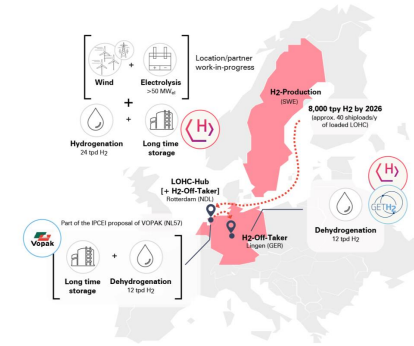High energy density

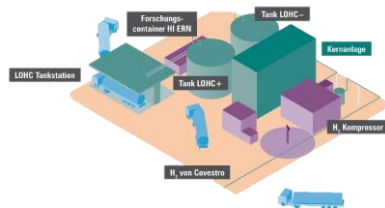# Our corporate highlights over the last months…

Opening the first public LOHC-HRS

First 8,000 tpa H2 storage & transport via LOHC

Scale up project in detail design

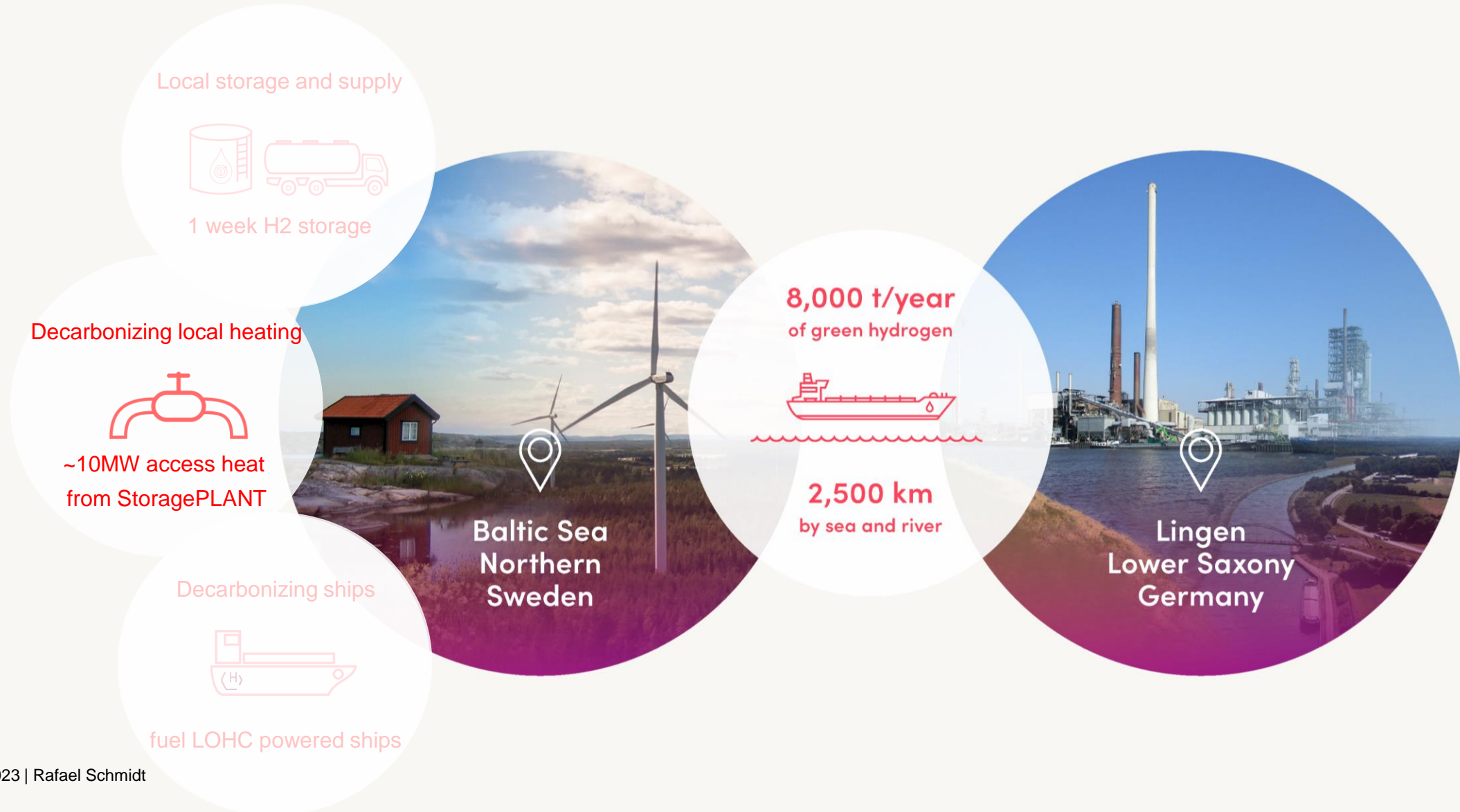## Amsterdam as central LOHC hub in EU

02

Our project –
Northern Green Crane

Project Northern Green Crane: IPCEI pre-candidate to handle 8,000 t/a industrial-scale green hydrogen in Sweden by 2026 …

Local storage and supply

1 week H2 storage

Decarbonizing local heating

~10MW access heat from StoragePLANT

Decarbonizing ships

fuel LOHC powered ships

8,000 t/year of green hydrogen

2,500 km by sea and river

Baltic Sea Northern Sweden

Lingen Lower Saxony Germany

… by providing significant local value and strengthening the intra-European collaboration to achieve climate goals
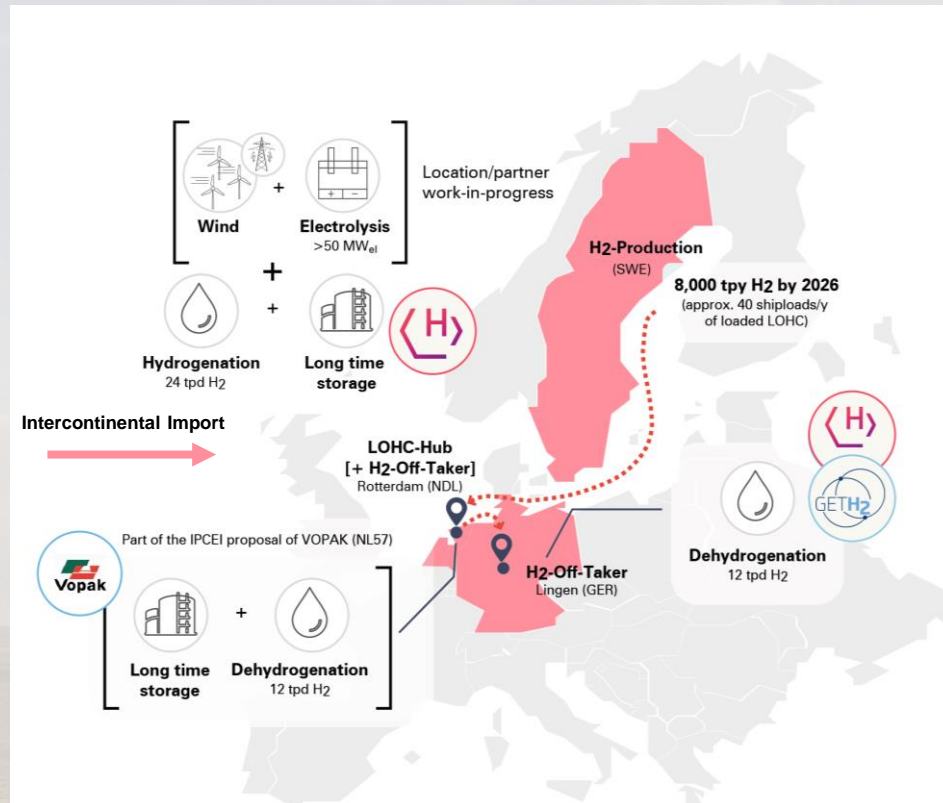
With Sweden as a central project location for Northern Green Crane, Hydrogenious LOHC will **supply significant local value and implement infrastructure to decarbonize Europe**

Hydrogenious LOHC

Northern Sweden as important
project location –
creating local value, decarbonizing
local heating grid and providing
essential cornerstone to
decarbonize Europe.

Northern Green Crane

Efficient, safe and fast: Utilizing conventional oil tankers and oil tanks to transport and store green hydrogen with LOHC.

Northern Green Crane

Transporting hydrogen safely
via LOHC throughout Sweden
and to the Port of Rotterdam and
onwards to Lingen in Germany.
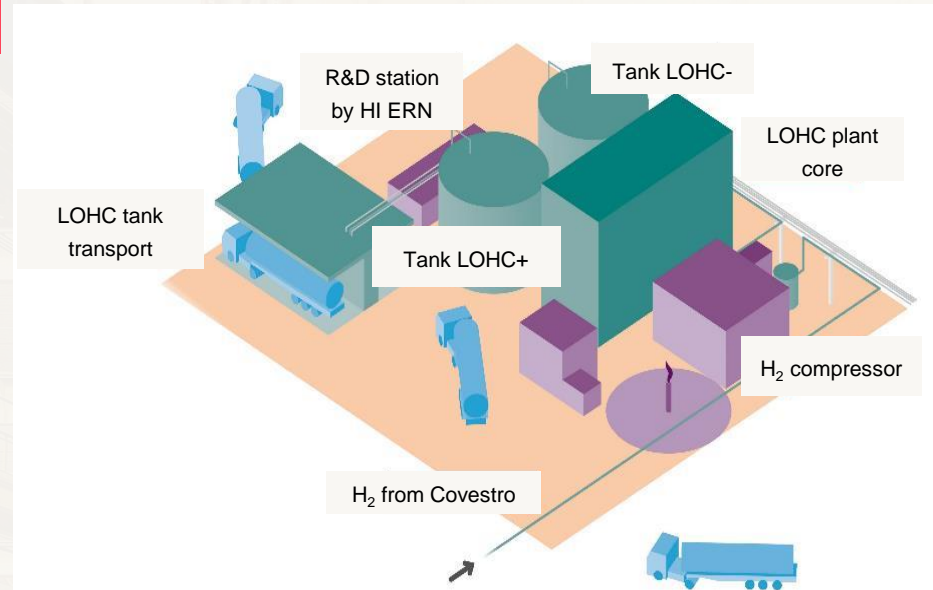
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Hydrogenious LOHC

Strengthening economy by providing local storage and supply and by exporting green hydrogen to demand centers via LOHC.

Our scale up project: World's largest LOHC storage plant …

1,800 t/year

storage of hydrogen

Chempark Dormagem
Cologne
Germany

Port of Rotterdam
Netherlands

… which is under construction to set a proof point for the LOHC technology

R&D station by HI ERN

Tank LOHC-

LOHC plant core

LOHC tank transport

Tank LOHC+

H_2 compressor

H_2 from Covestro

covestro

Ministry of Economic Affairs, Industry, Climate Action and Energy of the State of North Rhine-Westphalia

The project is going be **industrial scale & blueprint for setting up large volume LOHC together** with strong and well-known project partners

03

Our contribution

LOHC technology offers multiple benefits…

Hydrogenious LOHC

…for our partners

Flexible in handling
Ideal to meet the requirements of realistic supply chains incl. underground and long-term storage

Safe to use
Permitting possible also in urban areas, no extensive training of personnel necessary

Cost efficient
As multiple studies from renowned institutes have shown e.g., McKinsey & Company, Goldmann Sachs, etc.

Making use of existing fossil fuel infrastructure
E.g., storage in ports & refueling stations, transportation by existing trucks, trains, and ships

…for the local and European economy

Providing large scale H2 to European industry
Securing competitiveness, increasing location advantage and Supporting European climate goals

Creating jobs
Innovation made in Europe – securing direct and indirect jobs in Europe

Enabling efficiency
By providing a solution to transport and store hydrogen we enable the smartest connection of hydrogen sources and offtakers

Diversifying energy supply
By accessing low cost green H2 sources in remote countries an providing clean energy to local economy

How the region Luleå benefits from our projects, especially with Northern Green Crane

Local innovation and employment

› Building worlds largest LOHC plant in Luleå – displaying innovation made in Europe and attracting visitors

› Building with high share of local work force, operation with local staff and second life usage of existing port infrastructure

› Expanding usage of local plant with local distribution, fueling LOHC powered ships, providing local energy storage and import of hydrogen

Decarbonizing local heat grid

› Replacing coal powered heat with green heat in local heating grid

› With green heat the project contributes to local decarbonization goals

› Base load heat production provides a reliable source

Thank you!

Let's carry and integrate the new energy world together.

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LOHC ship compared to LH2 Frontiers

LH2 Frontiers

LOHC Northern Green Crane

116m

VS

140m

1250 m³ LH2 x 71 kg/m³ = **~88 tH2**

4.500 m³ LOHC x 44 kgH2/m³ = **~200 tH2**