



# HyEx: GREEN AMMONIA



February 2023



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**ENGIE**

## Our purpose

to act to accelerate the transition towards a carbon-neutral economy, through reduced energy consumption and more environmentally-friendly solutions.

## Our 4 core activities

### Renewables

- **No. 2** of the power purchase agreement (PPA) in the world
- **34 GW** of installed capacities @100%
- **4 900** employees worldwide

### Networks

- **+250 000 km** of gas distribution network worldwide
- **~ 5 600 km** of electricity transmission network
- **22 500** employees worldwide

### Energy Solutions

- **No. 1** urban cooling & **No. 3** urban heating network in the world
- **23 GW** of installed capacities in decentralized energy
- **47 500** employees worldwide

### Thermal production & energy supply

- **60 GW** of power generation capacity @100%
- Coordination of hydrogen expertise and development in the world
- **17 100** employees worldwide

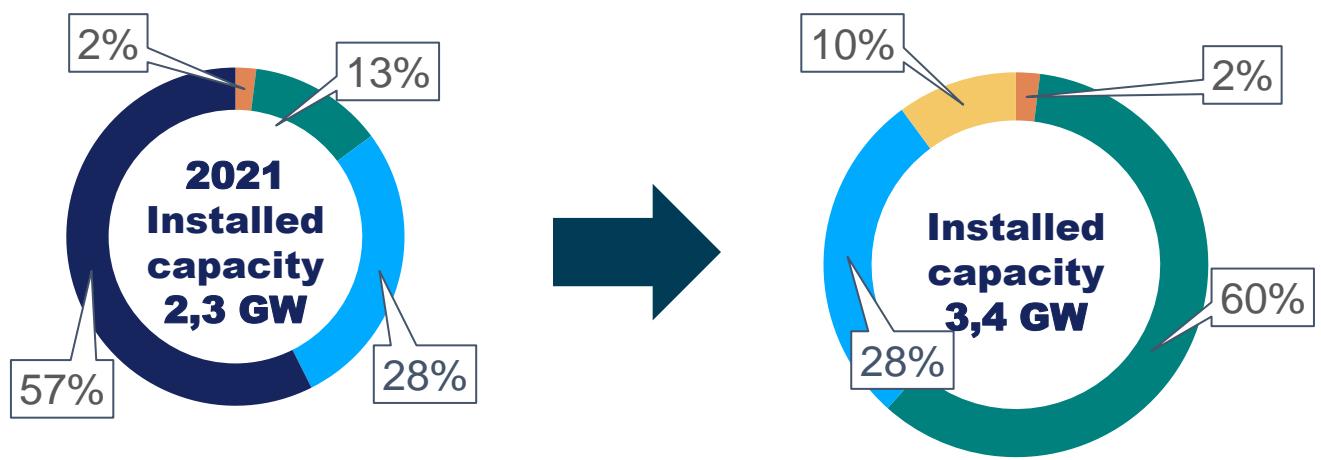
**A strong footprint in France and in 4 regions**  
France, Europe (excl. France), SOUTHAM, NORTHAM, AMEA



# ENGIE in CHILE



- 909 employees
- No. 4 power generation (11% market share)
- No. 3 transmission network (2407 km tx lines & 24 substations)
- 1.066 km natural gas transmission network
- 2 ports: Andino and Tocopilla:



■ Diesel ■ Renewables ■ Natural gas ■ Coal ■ Diesel ■ Renewables ■ Natural Gas ■ Biomass

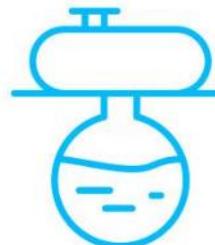


# Hydrogen targets for 2030



**4 GW**

of green hydrogen  
production capacity



**1 TWh**

of installed  
storage capacity



**700 km**

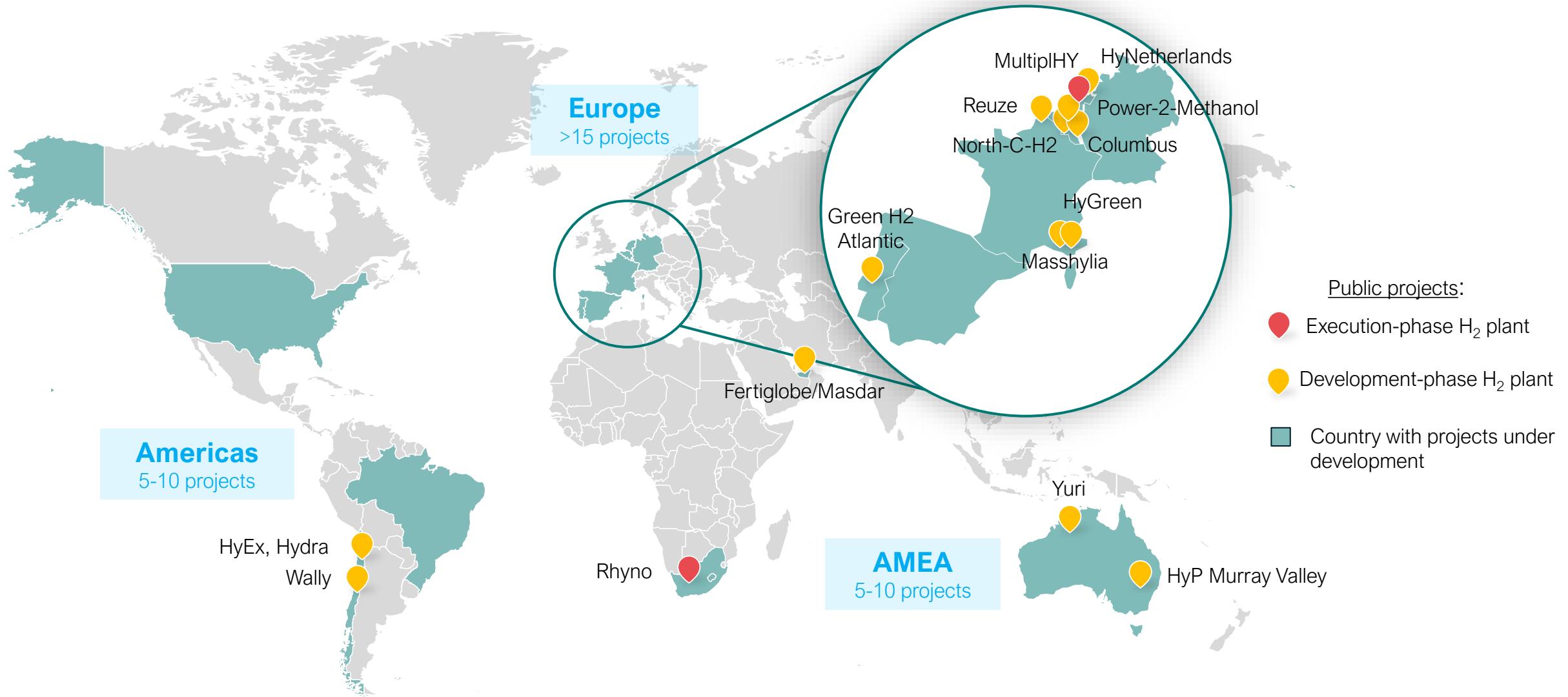
of dedicated  
hydrogen networks

Over

**100**

refuelling stations  
in operation

# A pipe of more than 30 large scale H2 projects worldwide



2

**ENAEX**

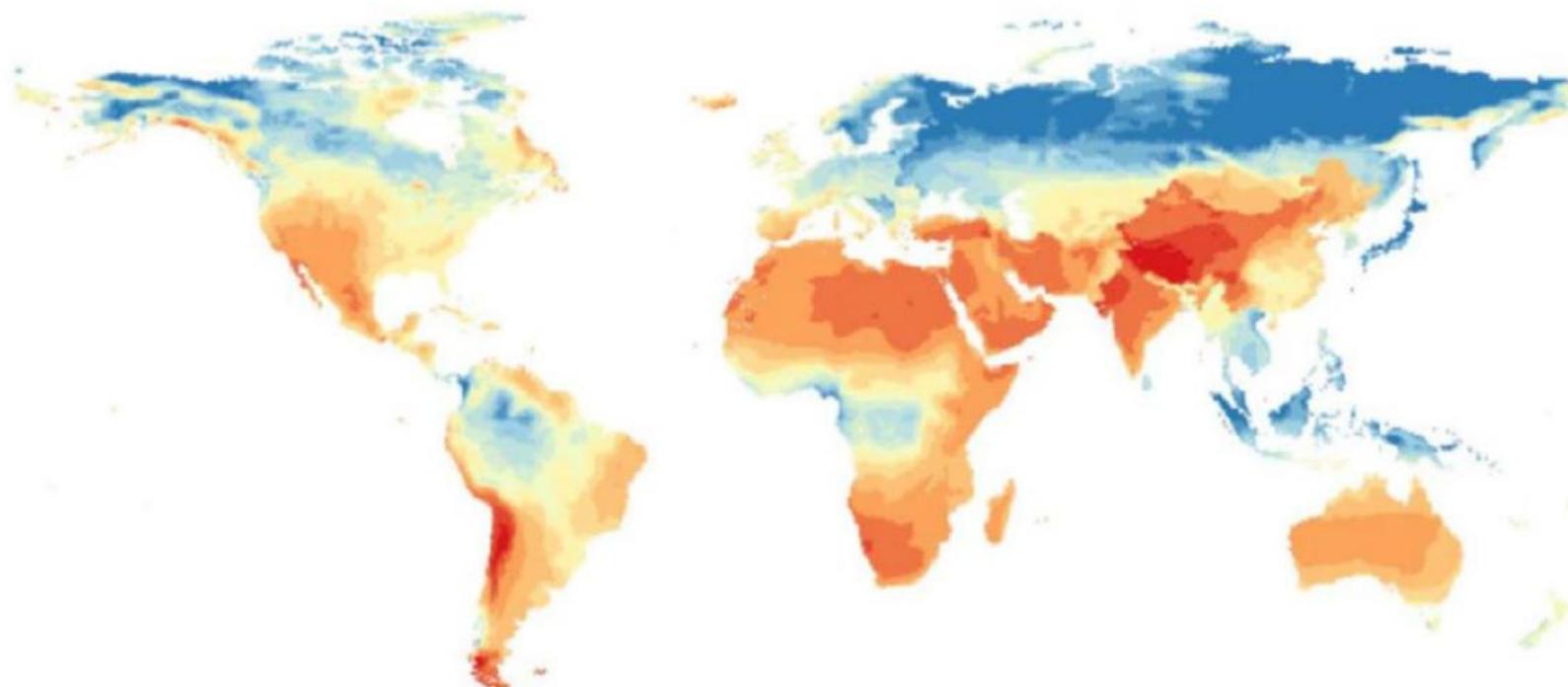


# 3

## H2 in Chile & HyEx

# CHILE HAS GREAT POTENTIAL

For H<sub>2</sub> generation



USD/kgH<sub>2</sub>

< 1.6
1.6 – 1.8
1.8 – 2.0
2.0 – 2.2
2.2 – 2.4
2.4 – 2.6
2.6 – 2.8
2.8 – 3.0
3.0 – 3.2
3.2 – 3.4
3.4 – 3.6
3.6 – 3.8
3.8 – 4.0
> 4.0

## CHILE SETTING THE TREND



### Mejillones Solar CF 37%

The driest / highest deserts, with the best solar radiation of the world.

**275 W/m<sup>2</sup>**

**2 WAY FOR EXPORTS**  
Pacific or Atlantic Ocean



### Magallanes Wind CF + 70%

The southern uninterrupted corridor. The best wind / tides conditions of the world.



Chilean generation potential carries to date an excess of +70x the actual installed capacity.

**+1800 GW. +160 Mt/py of Green H<sub>2</sub> production**

**Levelized cost of H<sub>2</sub> by 2050 ~ 1USD/Kg**  
the cheapest worldwide by 2030



# NATIONAL **GREEN HYDROGEN** STRATEGY

Chile, a clean energy provider for a carbon neutral planet

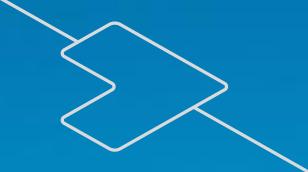
# +60 projects in development



- Pre-fid
- Development
- Operation



Based on design Hint



## HOW DO WE DO IT TODAY?

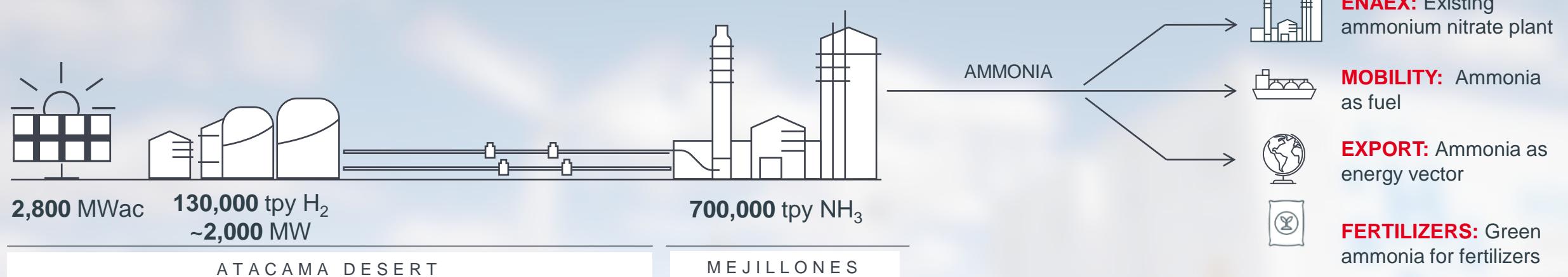


350,000 t/py Ammonia

SCOPE 3:  
750,000 t/py CO<sub>2</sub>



# HyEx



REDUCES:

**> 1 MM t eq. CO<sub>2</sub> per year**

EQUIVALENT TO THE EMISSIONS OF:

**360+ Trucks (300,000 cars)**

# HyEx

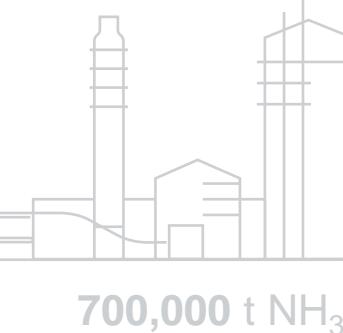
PROJECT



2,800 MWac

130,000 t H<sub>2</sub> | 2,000 MW

ATACAMA DESERT



700,000 t NH<sub>3</sub>

MEJILLONES

**PRILLEX**  
Plant

PHASE 1 (PILOT)



Green PPA

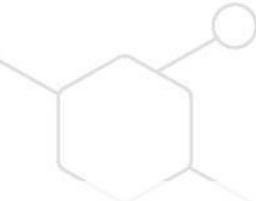
3,200 t H<sub>2</sub> | 26 MW



18,000 t NH<sub>3</sub>

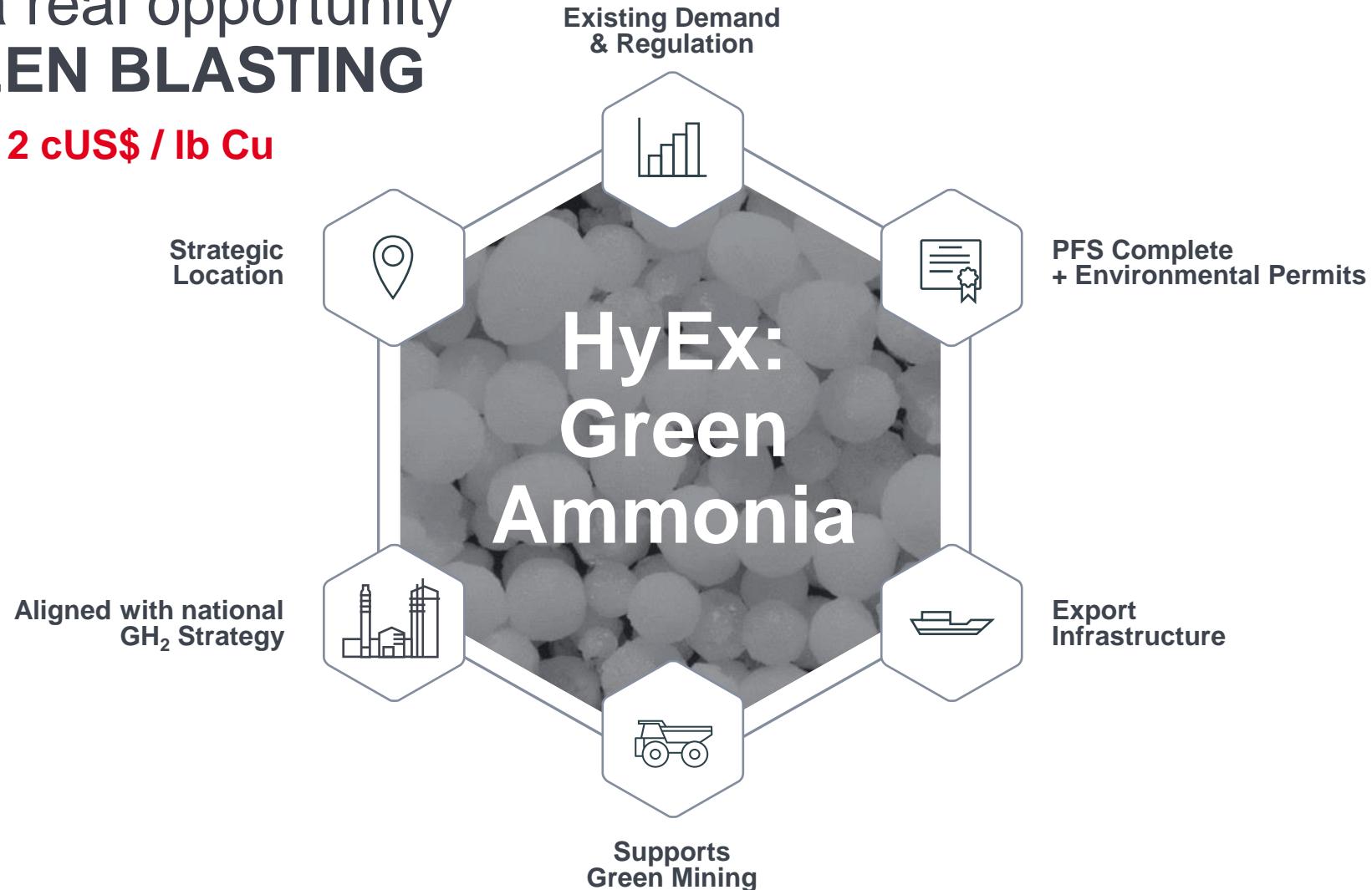
TOCOPILLA

MEJILLONES



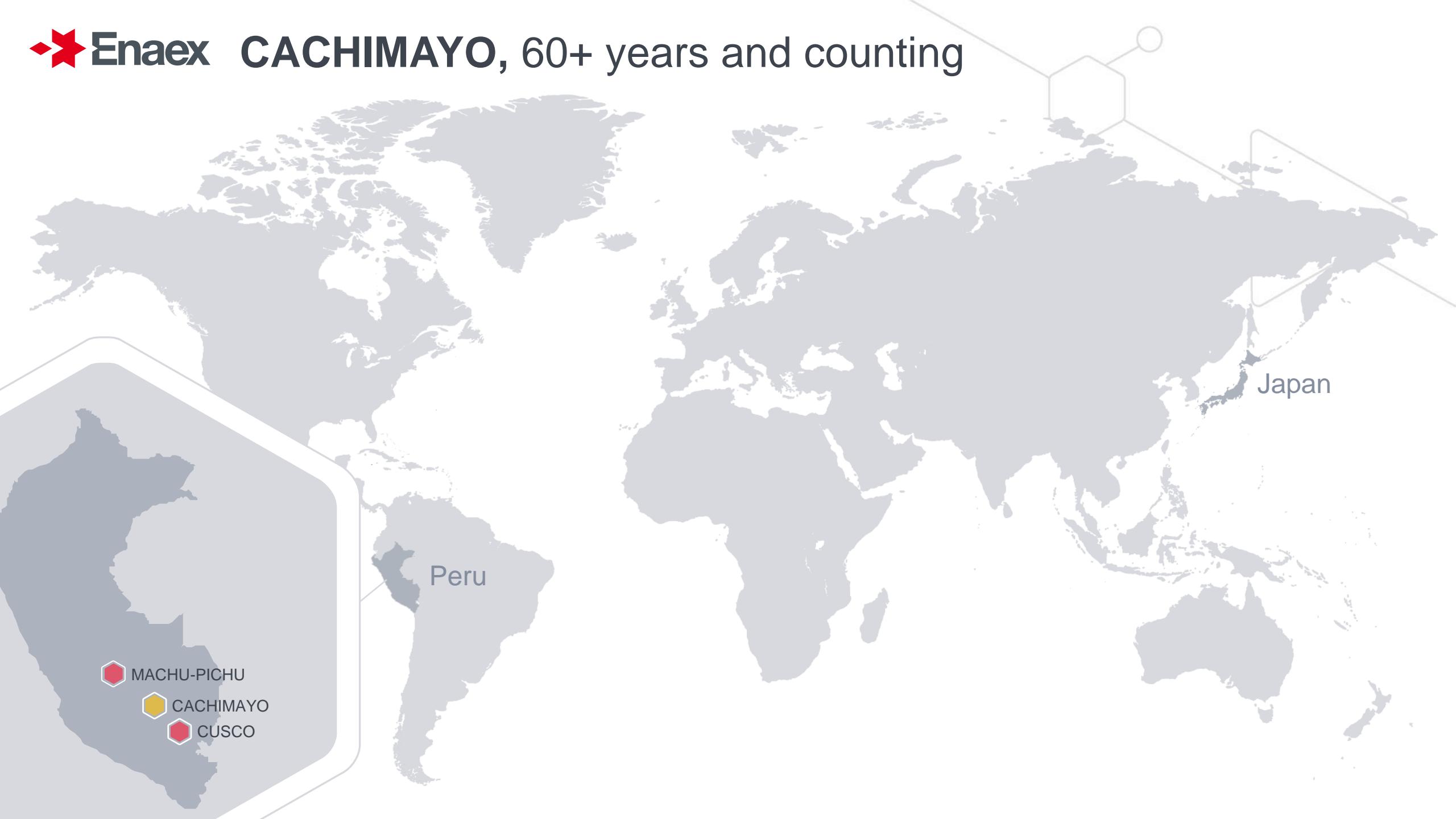
# HyEx: a real opportunity for **GREEN BLASTING**

Phase I: **1 - 2 cUS\$ / lb Cu**





# Enaex CACHIMAYO, 60+ years and counting



MACHU-PICHU

CACHIMAYO

CUSCO

Peru

Japan





MACHU PICCHU



MACHU-PICCHU

CACHIMAYO

CUSCO



18 MW Electrolyzer



CACHIMAYO



CUSCO



Ammonia

HyEx

Equity + Grants  
Applications

Techno  
partners

Int'l  
Grants &  
Financing

# FUNDING SOURCES

Mining  
industry

 CORFO

\$9.5M grant  


 ANTOFAGASTA  
MINERALS

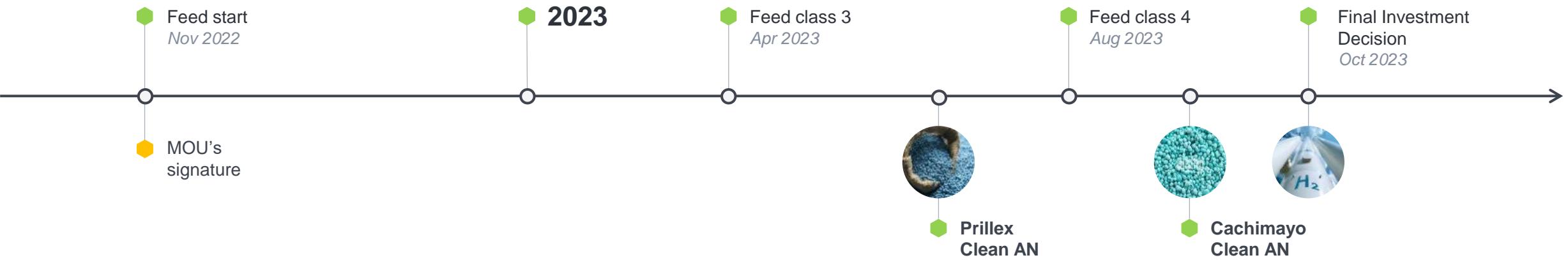
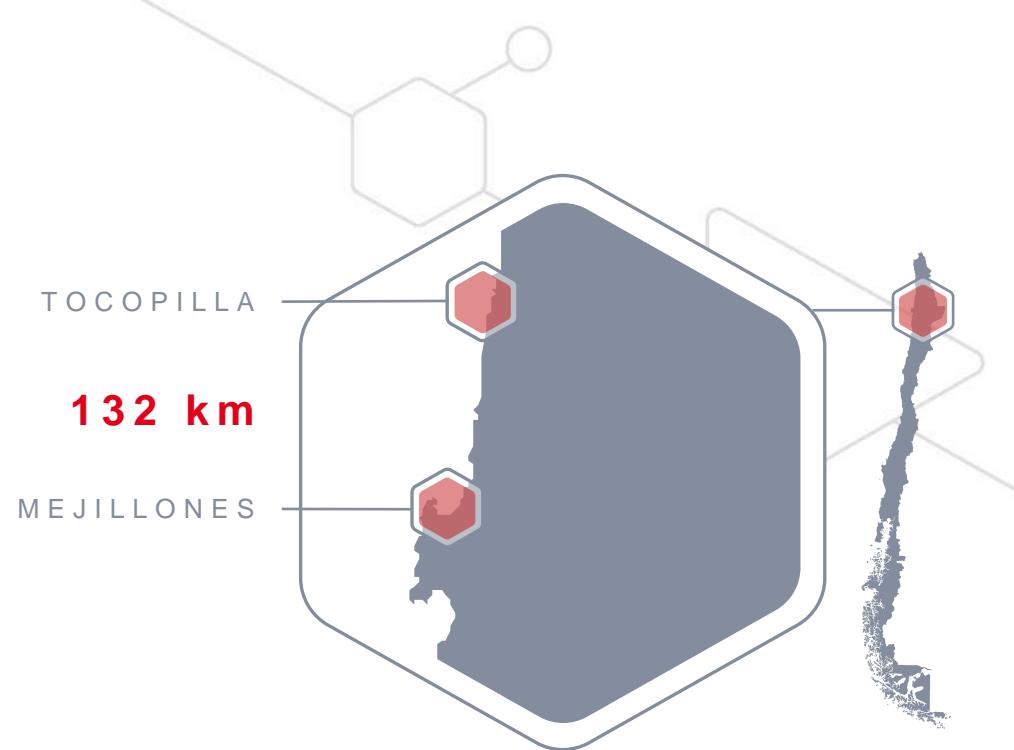
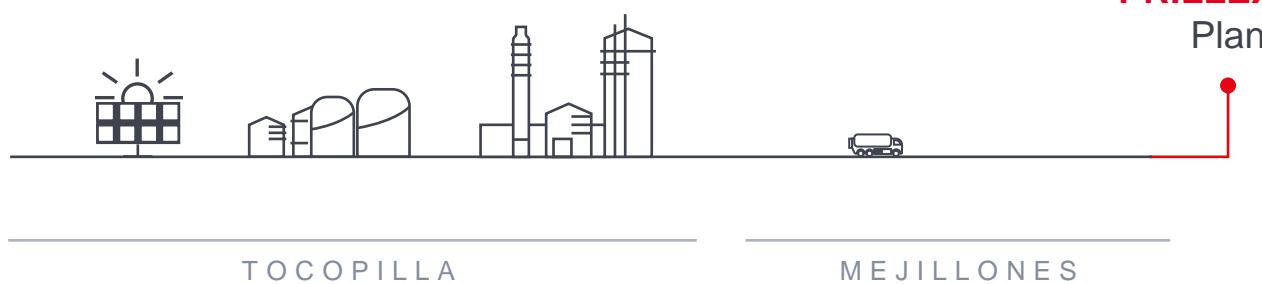
 AngloAmerican

 CODELCO

 Sierra Gorda SCM

 cAP

# HyEx: PHASE 1





# HyEx: GREEN AMMONIA

