



# 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

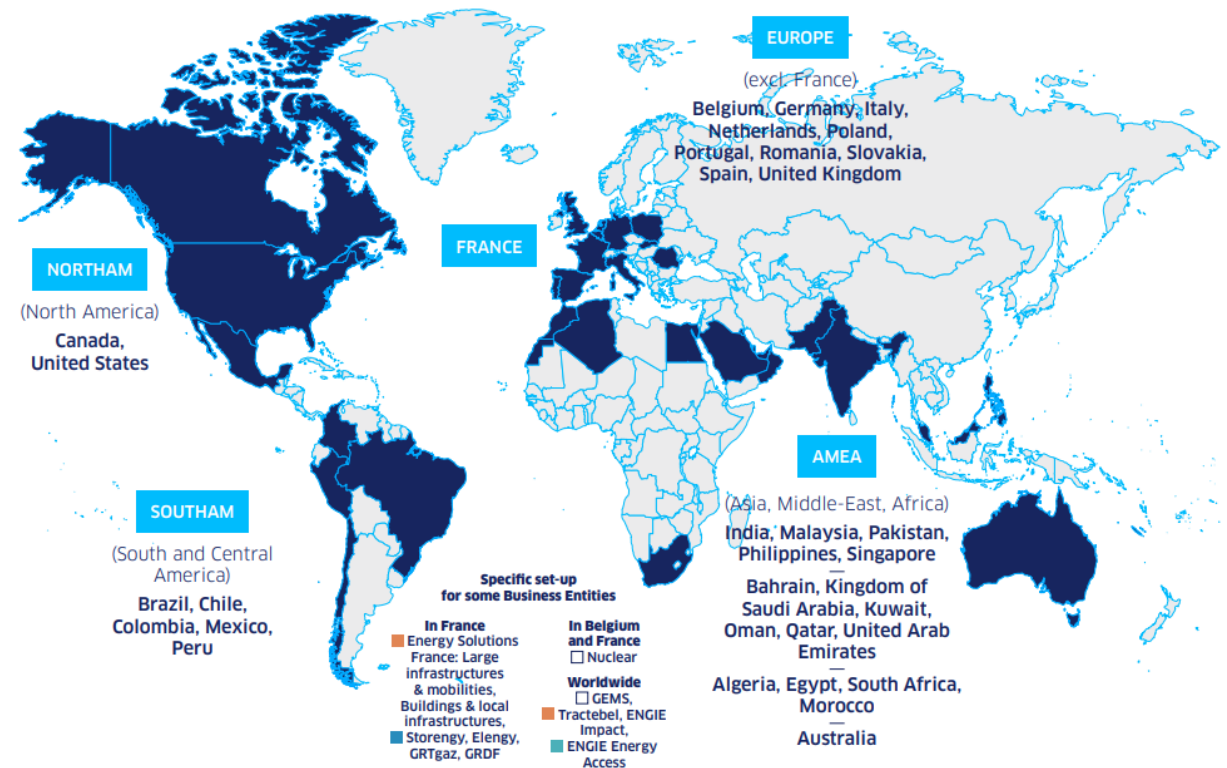
### Energy Solutions

- **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

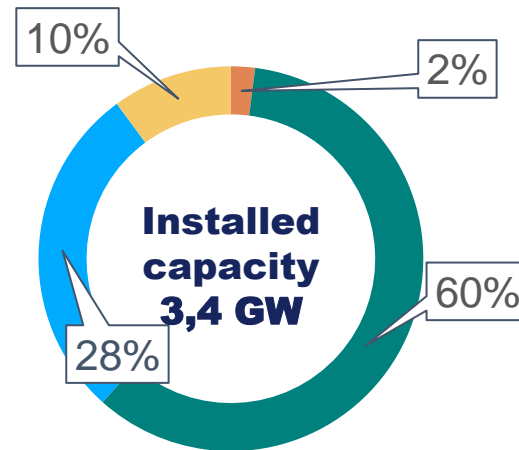
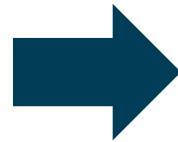
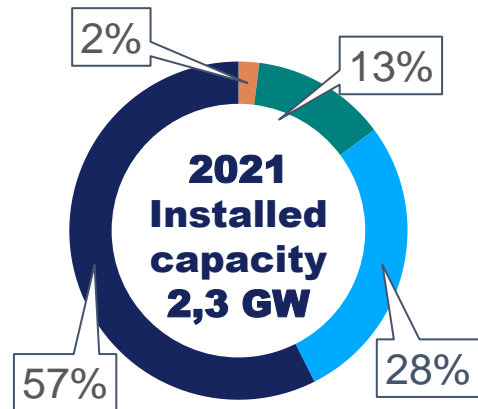
**A strong footprint in France and in 4 regions**  
France, Europe (excl. France), SOUTHAM, NORTHAM, AMEA



# 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



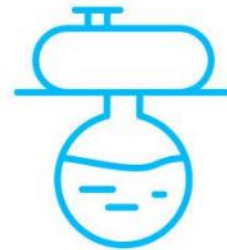
**4 GW**

of green hydrogen  
production capacity



**700 km**

of dedicated  
hydrogen networks



**1 TWh**

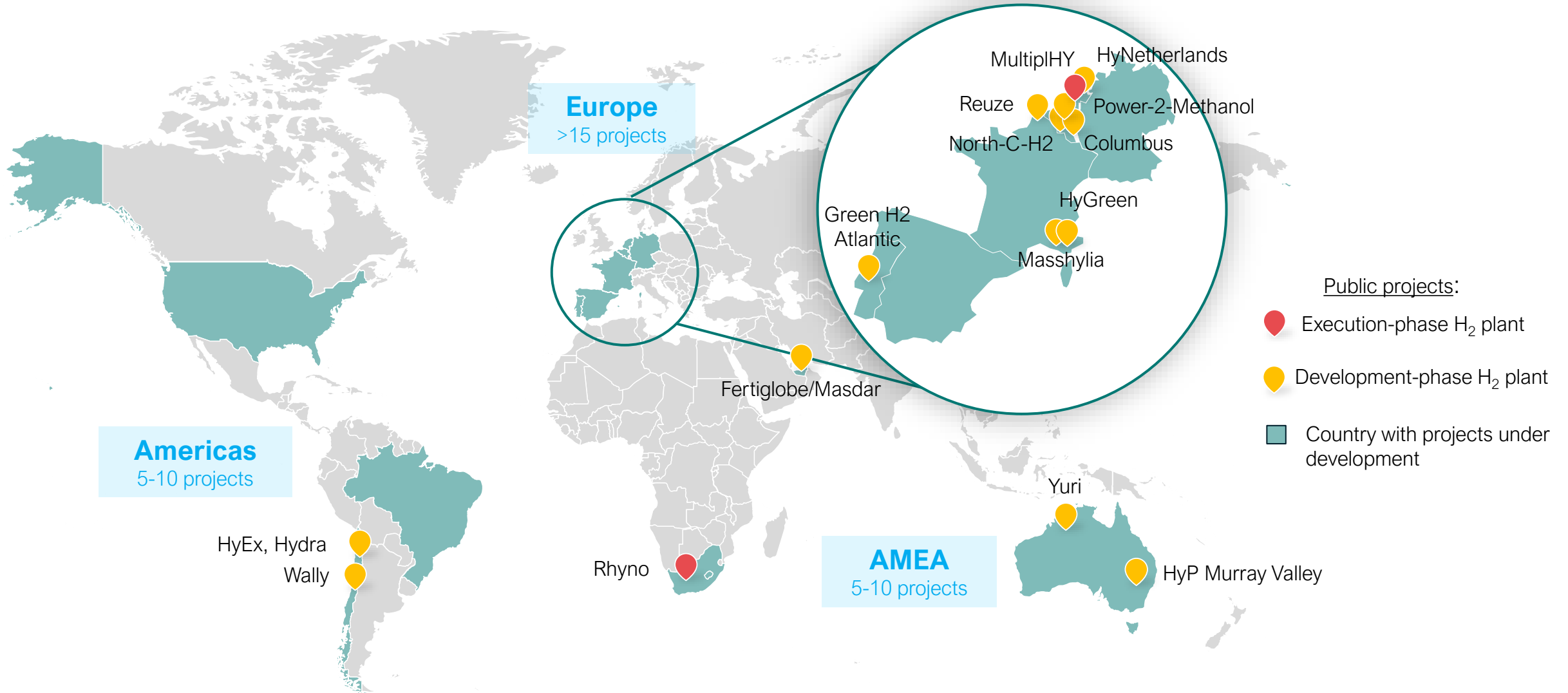
of installed  
storage capacity

Over

**100**

refuelling stations  
in operation

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



2

**ENAEX**



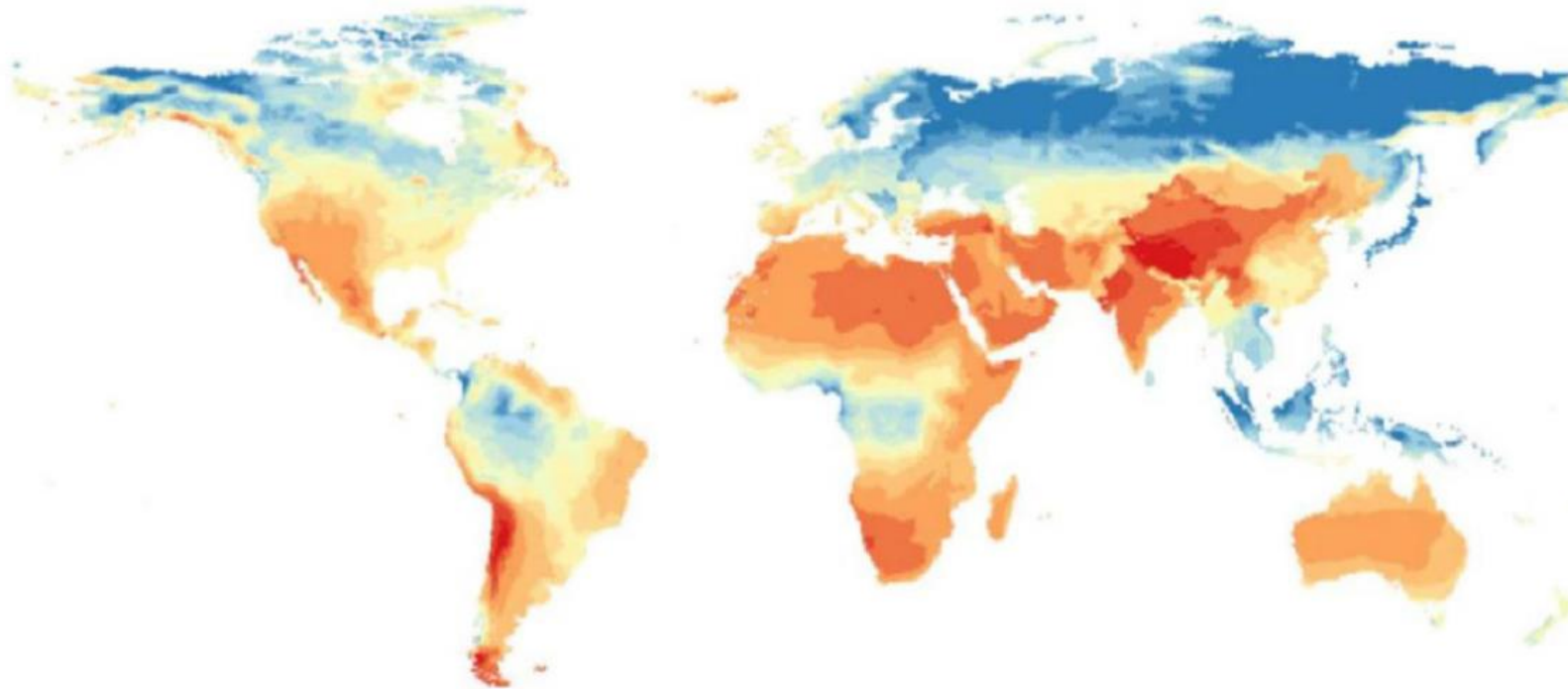


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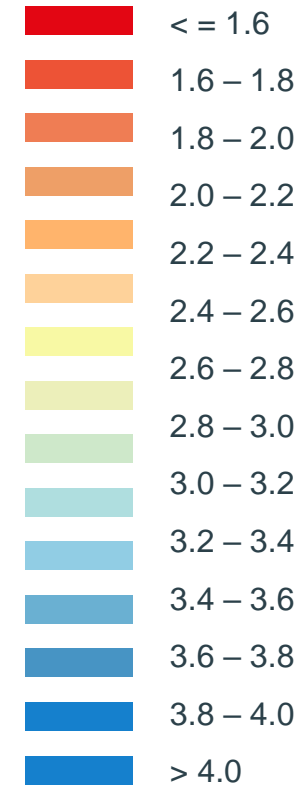
## H2 in Chile & HyEx

# CHILE HAS GREAT POTENTIAL

For H<sub>2</sub> generation



USD/kgH<sub>2</sub>



Source: LCOE from hybrid solar PV / onshore wind systems in the long term.  
MAN Energy Solutions, Energy Solutions, Energy Transition Feb.2022

# 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>**



Magallanes **Wind CF + 70%**

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

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

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**



Gobierno  
de Chile

[gob.cl](http://gob.cl)

# NATIONAL **GREEN HYDROGEN** STRATEGY

Chile, a clean energy provider for a carbon neutral planet



# +60 projects in development

H2  
Valles

- Pre-fid
- Development
- Operation



Based on design Hint



## HOW DO WE DO IT TODAY?

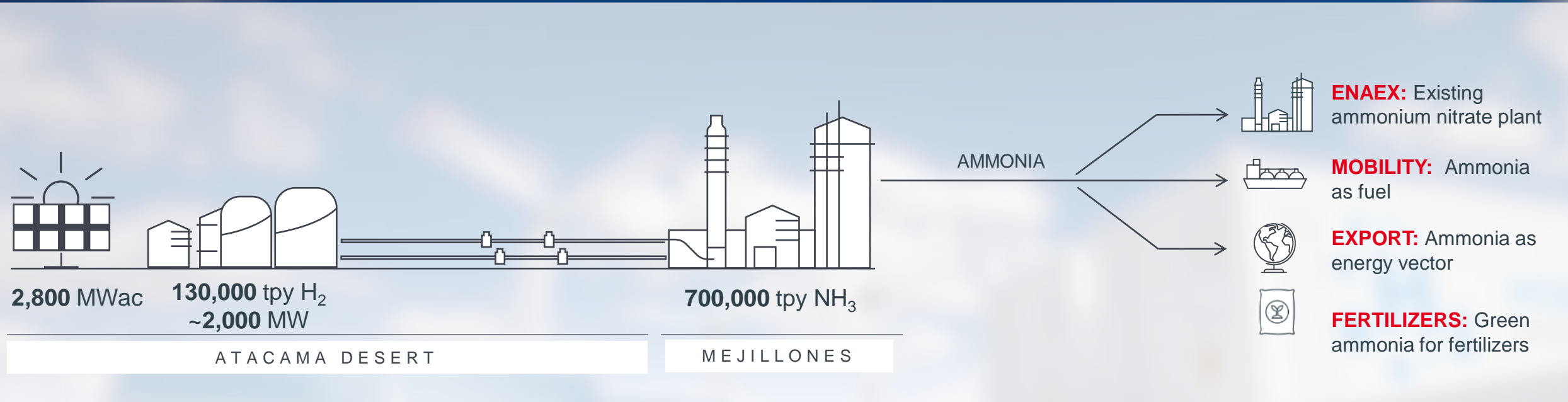


**350,000 t/py Ammonia**

**SCOPE 3:**

**750,000 t/py CO<sub>2</sub>**

# HyEx



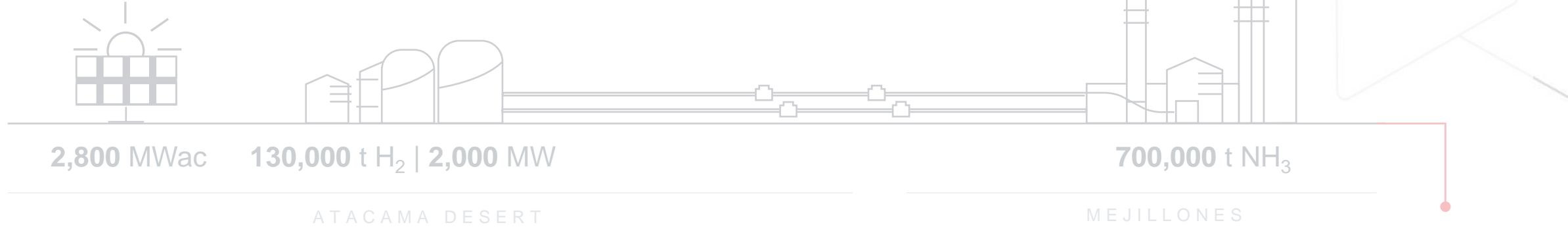
REDUCES: —————>

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

EQUIVALENT TO THE EMISSIONS OF:

360+ Trucks (300,000 cars)

## HyEx PROJECT



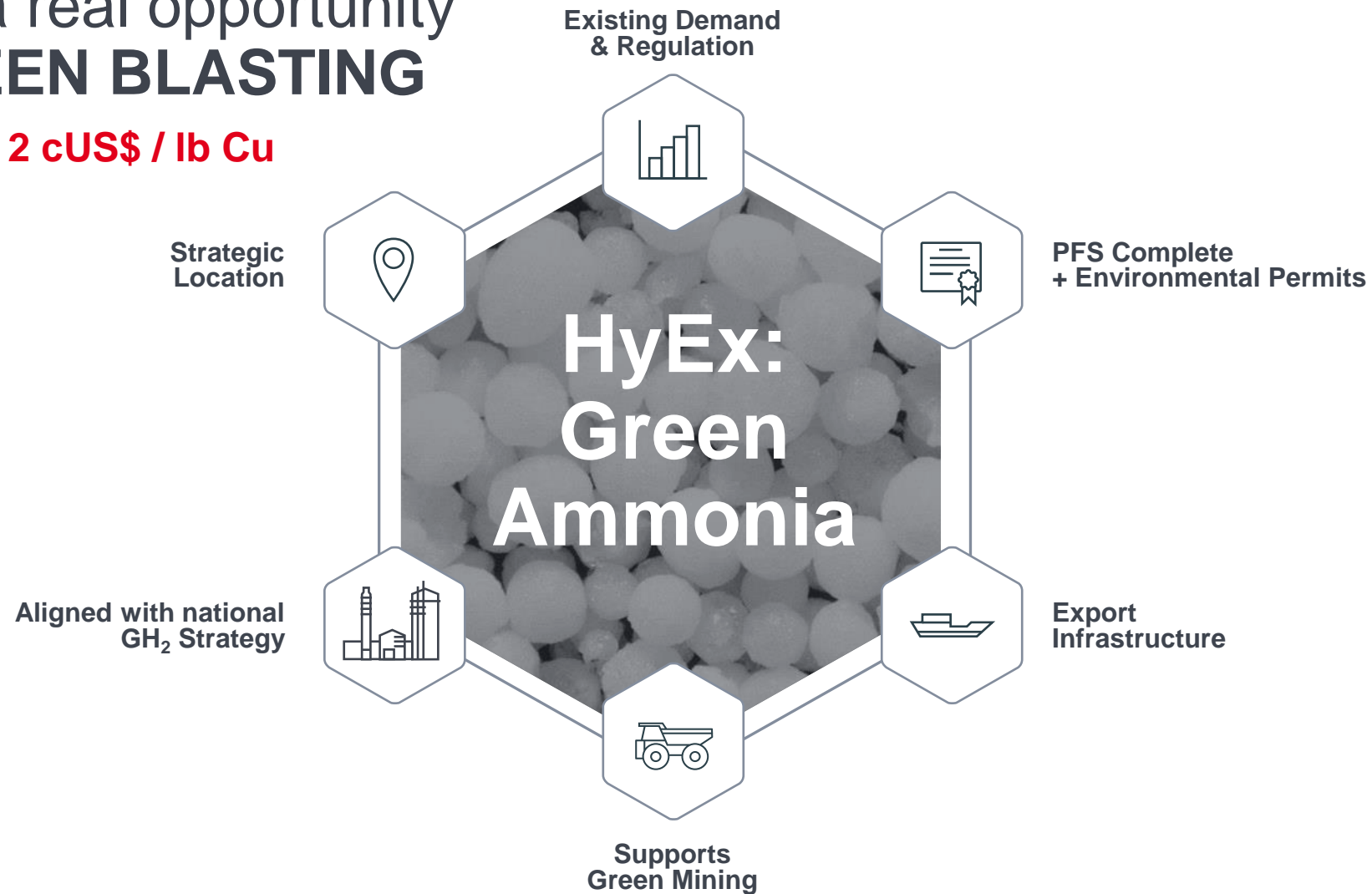
## PHASE 1 (PILOT)



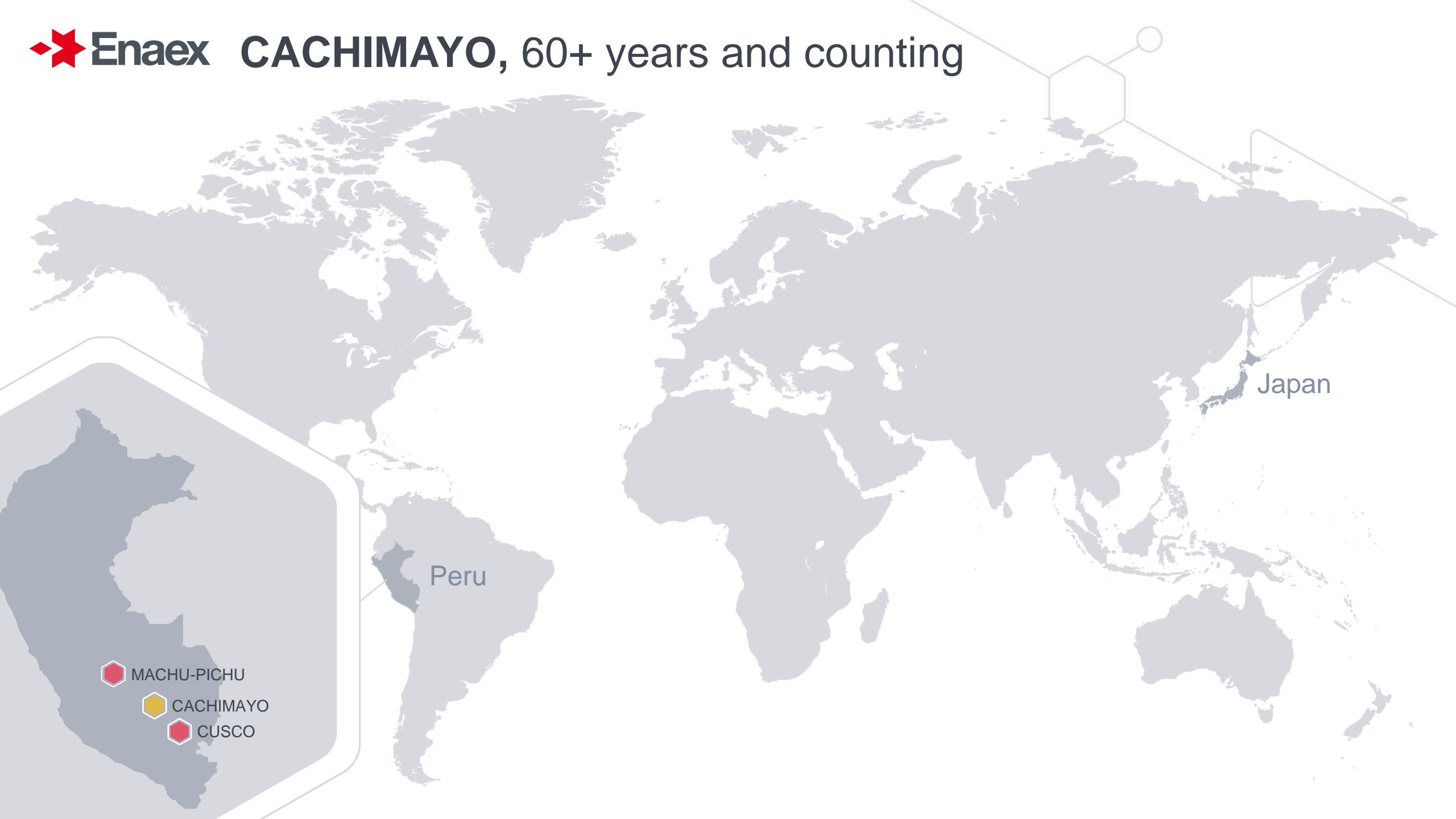


# HyEx: a real opportunity for **GREEN BLASTING**

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



# ✦ Enaex CACHIMAYO, 60+ years and counting





# Enaex CACHIMAYO, 59 years and counting



MACHU PICCHU



18 MW Electrolyzer

Ammonia



CACHIMAYO

CUSCO

MACHU-PICCHU

CACHIMAYO

CUSCO



# HyEx

Equity + Grants  
Applications

Techno  
partners

Int'l  
Grants &  
Financing

## FUNDING SOURCES



CORFO

\$9.5M grant



ENGIE

Mining  
industry



ANTOFAGASTA  
MINERALS



AngloAmerican



CODELCO



Sierra Gorda<sub>SCM</sub>



CAP



# HyEx: PHASE 1



TOCOPILLA

**132 km**

MEJILLONES





# HyEx: GREEN AMMONIA

