



Energy Observer Presentation

Kim Carnahan

Director of Disruption Technologies, ENGIE Impact

Kim.Carnahan@engie.com

ENGIE is a global leader in low-carbon energy and services

160,000

Employees globally

70

Countries

€61Bn

Revenues

1st

Independent power producer in the world

1st

Globally in microgrids

€12Bn

Investments in energy transition over 2019-2021

24.8GW

Installed renewable capacity

1st

Globally in cooling distribution networks

2nd

Globally in electric vehicle charging stations

€182M

R&D spend

+1,000

Researchers & Experts in 11 R&D centers

2nd

Global supplier of technical installation services

4th

Globally in heating distribution network

€166M

Investment in innovative start-ups

+100

University partners

ENGIE is a global green hydrogen leader



Commercial Leadership

Dedicated **green hydrogen business unit established in early 2018** that currently has a global team of 50+ resources

Founding member of the **Hydrogen Council in 2017** – a global CEO-led initiative of 92 companies with a vision to develop the hydrogen economy

Complementary ENGIE subsidiaries – industry-leading RE development, underground gas storage (Storengy), and gas transport solutions (GRTGaz)



Deep Technical Expertise

Over **20 years of hydrogen research with individual thematic labs** focused on green hydrogen, green mobility, and green thermal/fuels

Proprietary software (“Prosumer”) used for **hydrogen strategic assessments and pre-feasibility studies – optimizes RE + H2 asset sizes for various use cases** while minimizing TCO

Comprehensive **H2 engineering studies on pipeline injection and safety/operational risks** across hydrogen supply chain



Global Experience

Portfolio of **20+ hydrogen projects spread across 10+ countries and 5 continents**

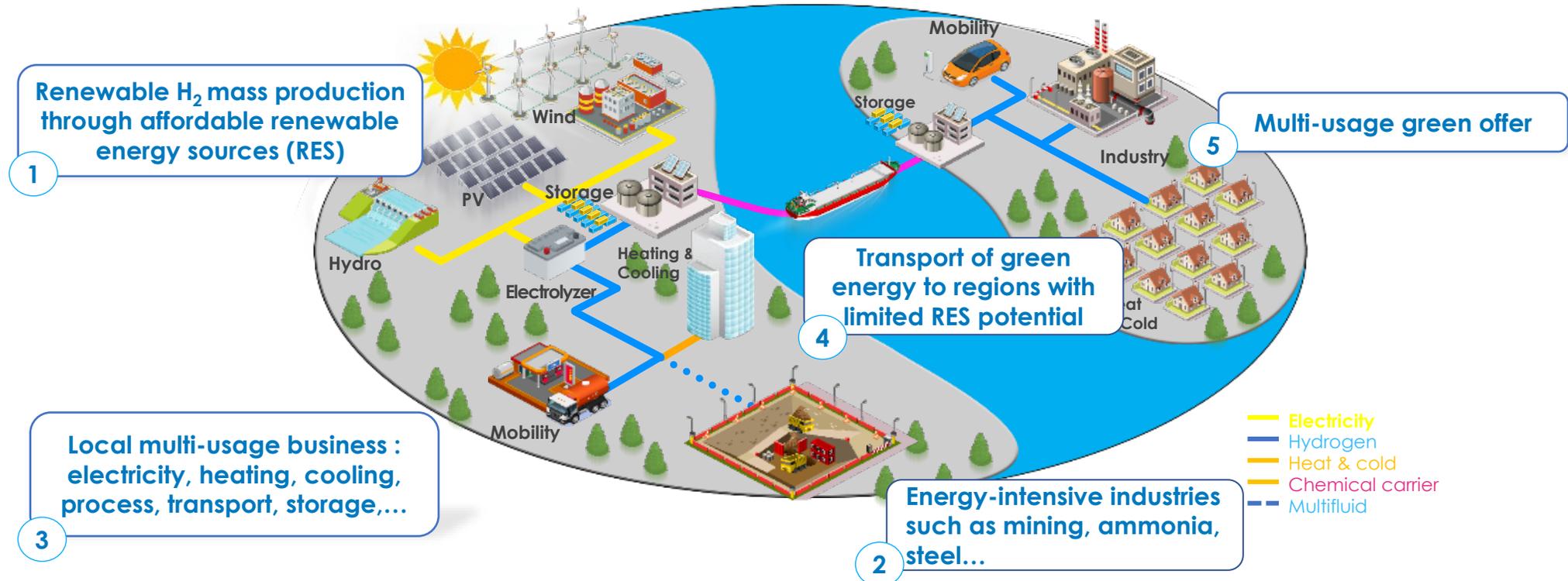
Network of **50+ partnerships with leading global players** including utilities, electrolyzer/power gen/chemical/specialty gas manufacturers, storage/transport providers, research institutions, and investment banks/financiers

Holistic project development and execution capabilities – Strategy/master plan, feasibility study, permitting, commercial deal (HPA/PPA), financing, EPC, O&M

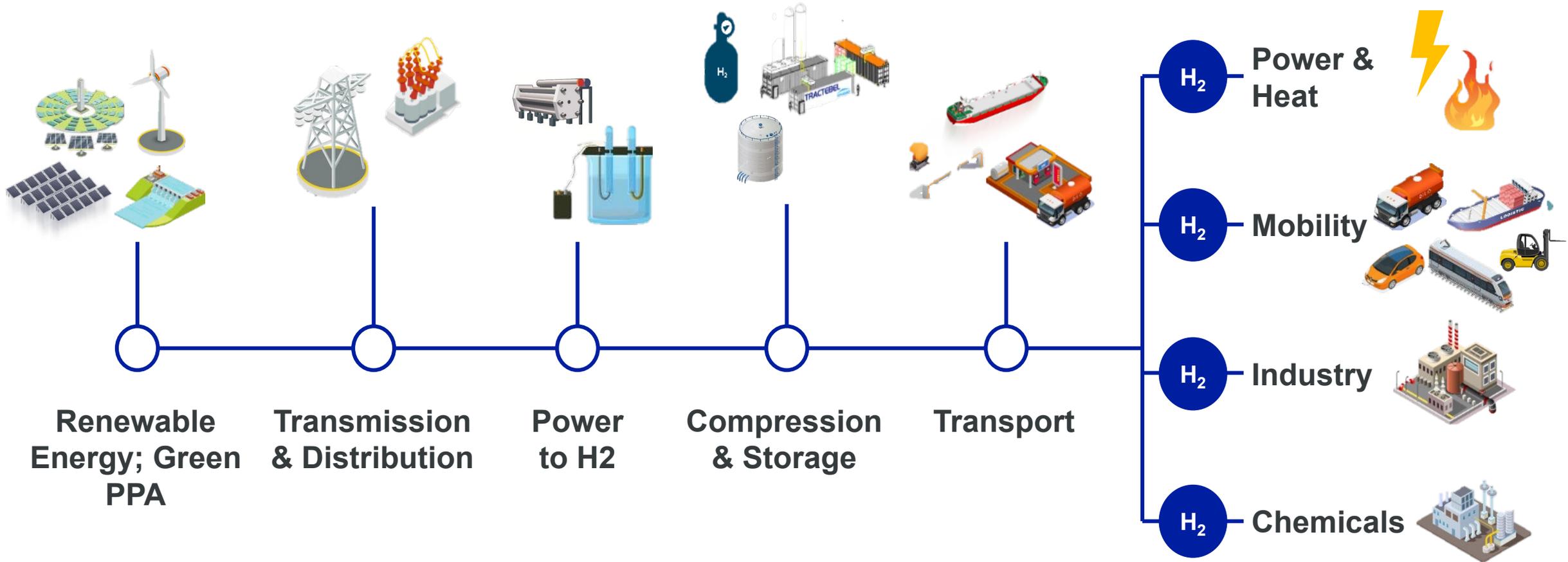
ENGIE's Hydrogen Business Strategy

to develop industrial-scale renewable hydrogen solutions for regional and global markets, with a focus on H2 hubs that bring together multiple applications for maximum decarbonization impact

- To **design, invest in, build and operate** industrial-scale hydrogen solutions
- To provide **turnkey customer solutions** across the value chain



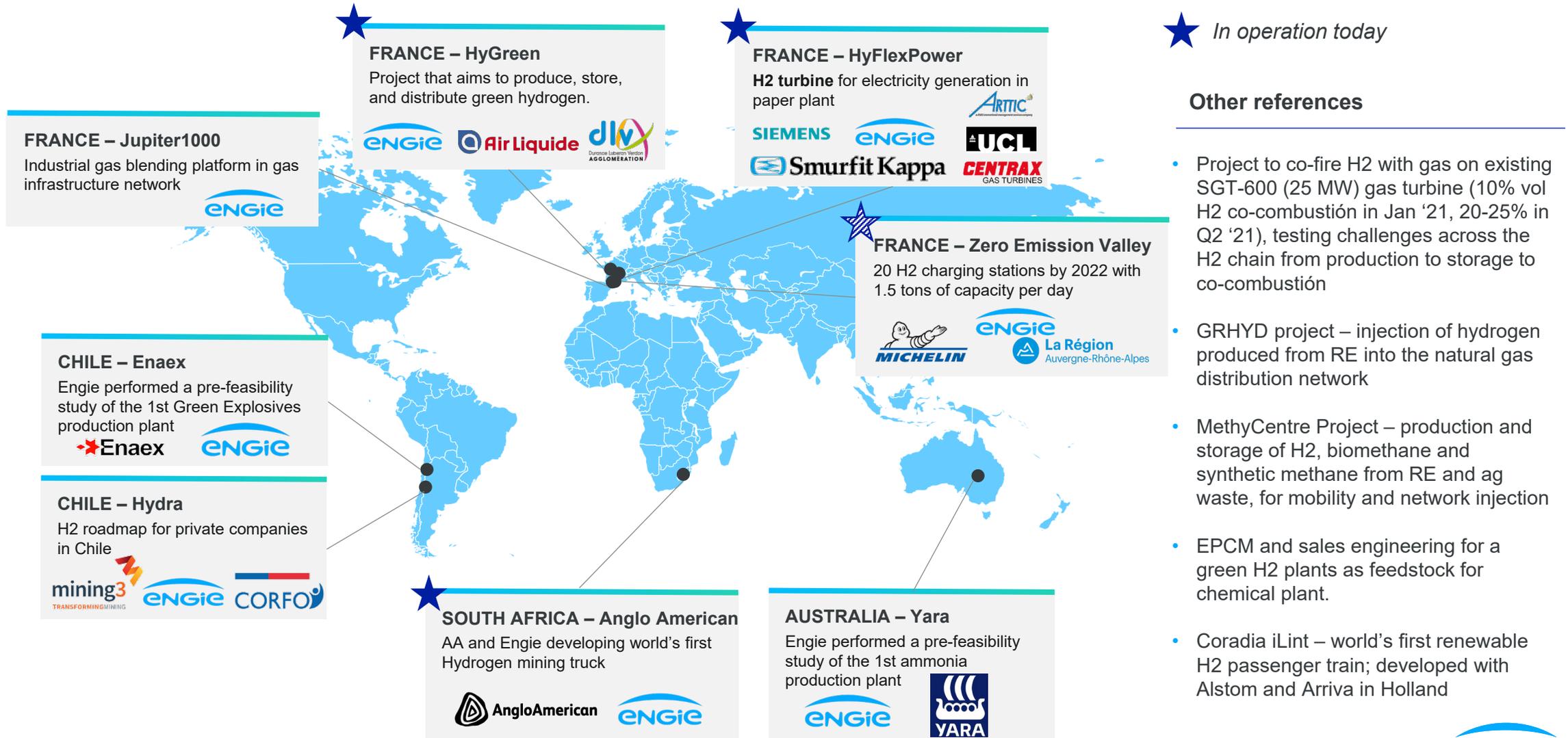
ENGIE is an H2 integrator, working across the entire value chain depicted below



CH₄ (green methane)
NH₃ (green ammonia)
CH₃OH (green methanol)

ENGIE is developing H2 projects globally

A selection of ENGIE references along the renewable hydrogen value chain at various stages of development



Zero Emission Valley project

20 H2 charging stations by 2023 with 1.5 tons production capacity per day

Regional, National and European funding received



Partners Region AURA, Michelin, Bank of Territories and Crédit Agricole

Location Auvergne-Rhone Alpe, France

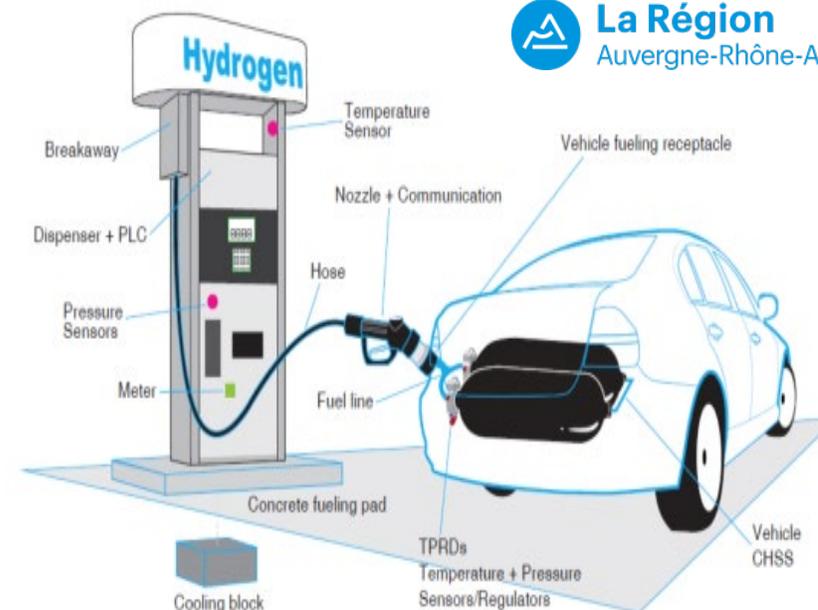
Period Ongoing since 2019; First HRS in operation since February 2020

Scope **Business Modelling**

- 20 H2 charging stations by 2023 with 1.5 tons production capacity per day,
- Renewable H2 production via 15 onsite electrolyzers, and distribution for mobility.

Proof of concept

- ENGIE and partners plan to put 1000 hydrogen vehicles into circulation. The project also involves the experimentation of 2 hydrogen buses for the Greater Chambery, 50 light vehicles and 148 vans of more than 2.5 tons.



Yuri project

Co-creation of the 1st Green Ammonia production plant



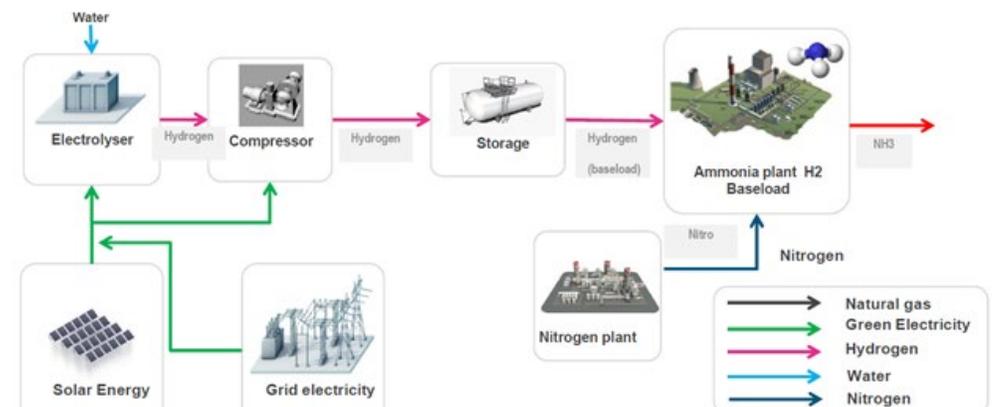
Client YARA
Location Pilbara region, Australia
Period Ongoing since 2019

Scope **Preliminary Business Modelling**

- Definition, sizing and optimization of the entire hydrogen supply chain (LCOH),
- Support to the client on the scale-up project financial valuation.

Proof of Concept

- Development and implementation of renewable H2 supply chain,
- Integration with industrial project (flexibilisation),
- Proof of concept of Green Ammonia production plant.



<https://www.yara.com/news-and-media/news/archive/2019/yara-and-engie-to-test-green-hydrogen-technology-in-fertilizer-production/>

Rhyno project

Co-creation of the 1st hydrogen powered Mining Truck solution



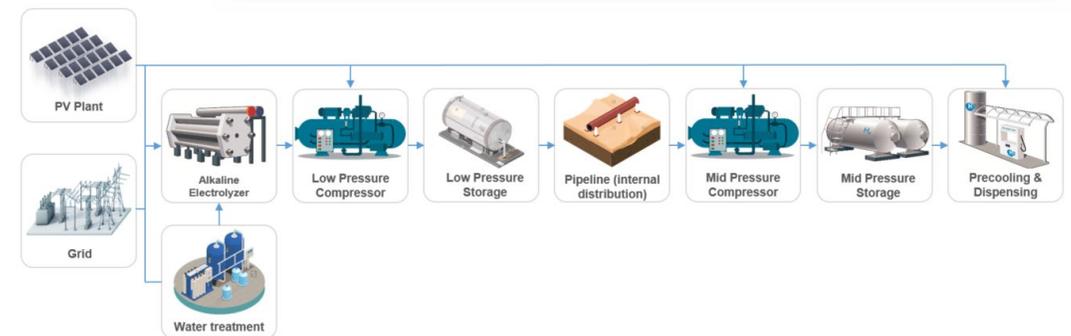
Client Anglo American
Location Mogalakwena, South Africa
Period Ongoing since 2019. Purchasing done. Under construction.

Services provided **Preliminary Business Modelling**

- Definition, sizing and optimization of the entire hydrogen supply chain (LCOH),
- Support to the client on the scale-up project financial valuation.

Proof of Concept

- Protocols and optimization strategy for heavy duty refueling,
- Development and implementation of renewable H2 supply chain,
- Proof of concept of H2 Mining Truck.



<https://www.angloamerican.com/media/press-releases/2019/10-10-2019>