# Hatch Green Hydrogen Application for Green Fuel



**Michel Carreau, Ph.D, Director Hybrid Power (Renewable, Storage, Green Hydrogen, Feb. 17, 2022**

# Hatch – Engineering and Innovation

Roots over

**100**

Years

Experience in

**150**

Countries

Out of

**65**

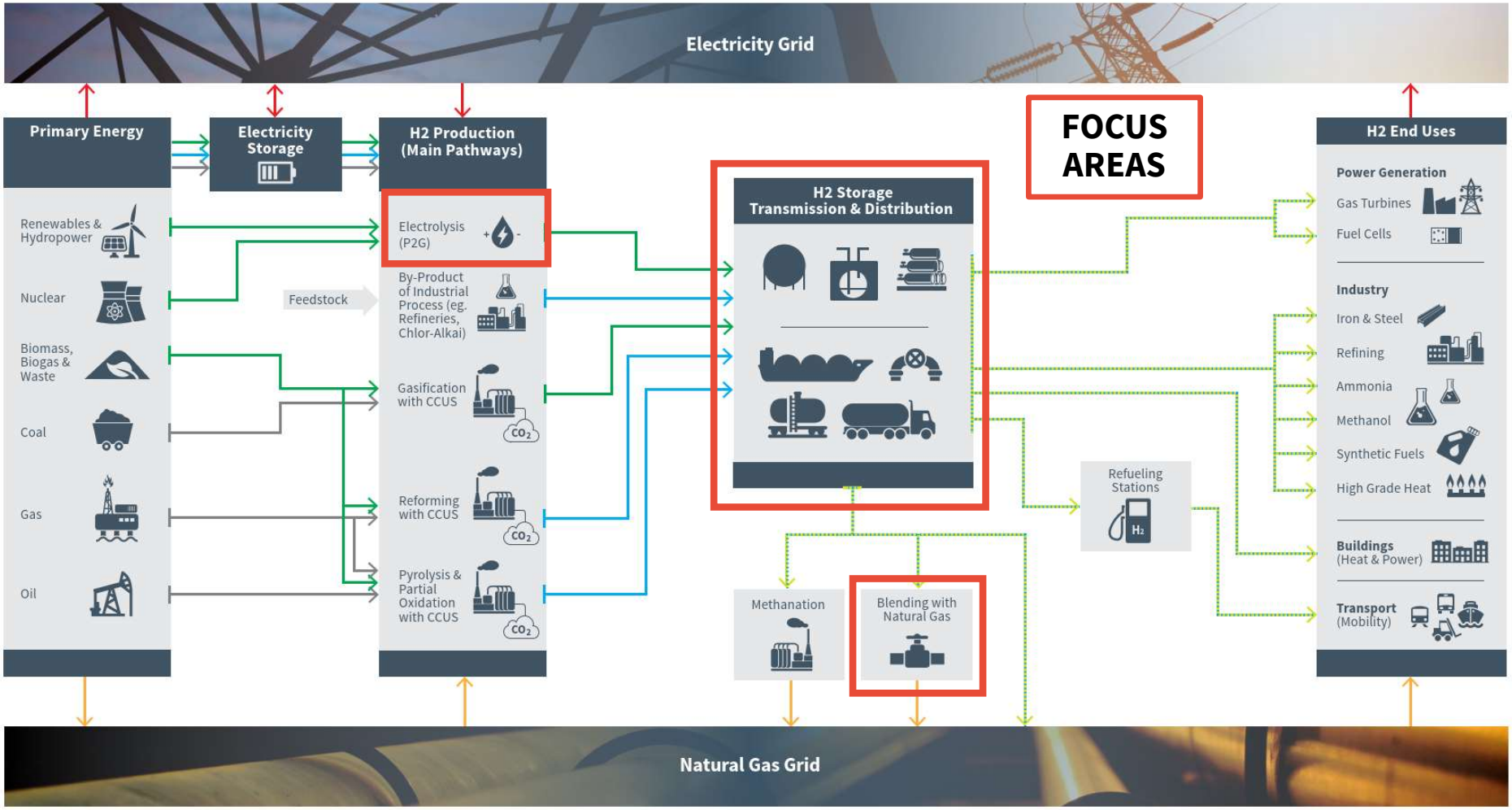
Offices

With

**9,000**

Professionals

# Hydrogen Value Chain



# Air Liquide, Bécancour, Quebec
## Hydrogen Production Plant Expansion

- Existing facility uses steam methane reforming of natural gas
- 20 MW PEM electrolyzer system in operation using green hydropower electricity
- Local industrial hydrogen user and H2 exported to mobility user liquified.

- Currently the largest green $H_2$ facility in the world using PEM technology.
- Hatch was responsible for providing the following:
  - Construction Management
  - Health and Safety Management
  - Project Management, Project Controls, and Services



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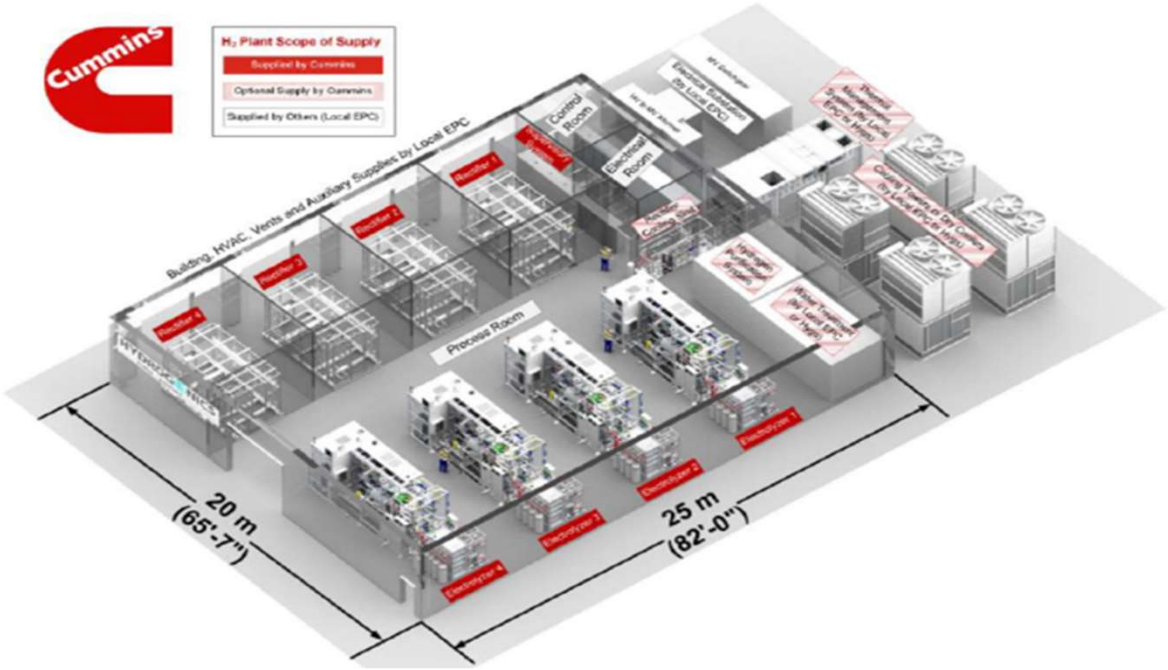
# Example of a 20 MW Plant

**SCALABLE PRODUCT PLATFORM**
**4 X HYLYZER®–1000 = 20MW**
**8640 kg/day $H_2$ Plant**




**KEY BENEFITS OF PEM ELECTROLYSIS**

1. Highest efficiency
2. Compact / Modular for low installation costs
3. 30 bar without compressor for ultra low maintenance
4. Rapid dynamic response
5. No harmful chemicals

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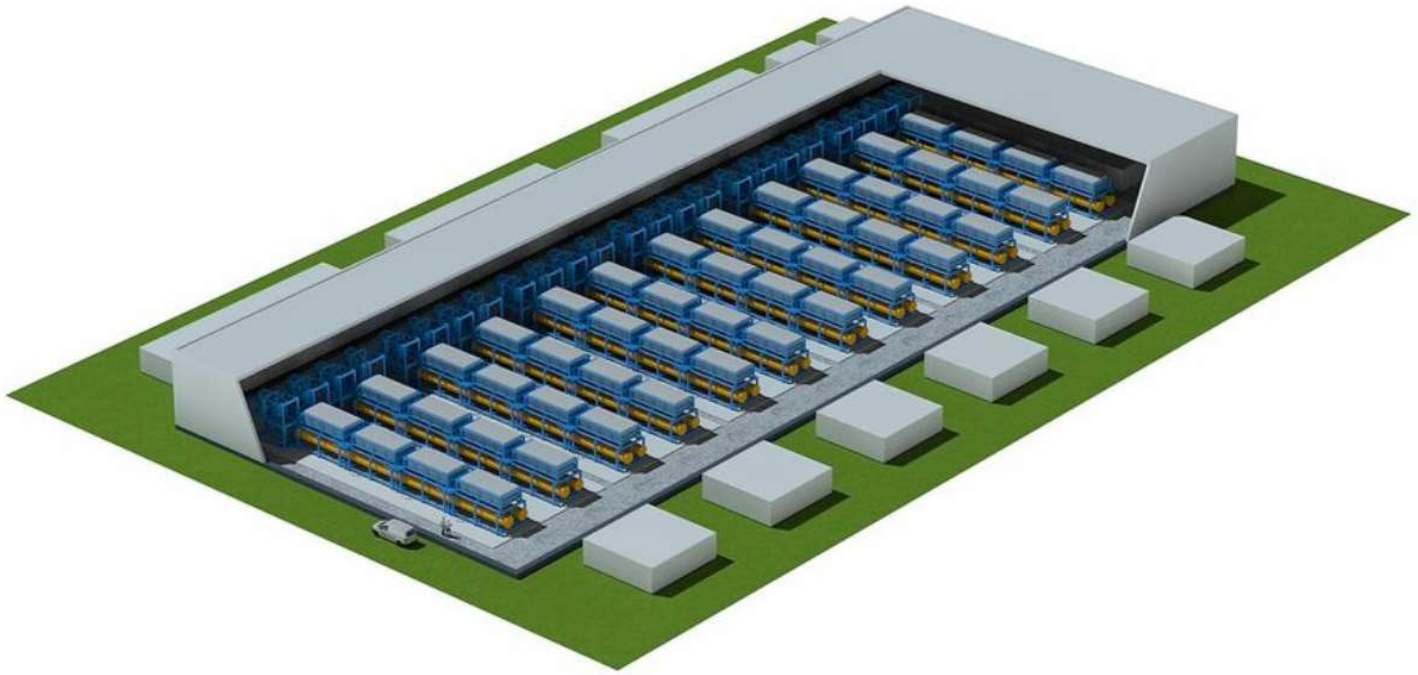
*Artist rendering of a 120 MW alkaline electrolysis array (image courtesy of Thyssenkrupp)*





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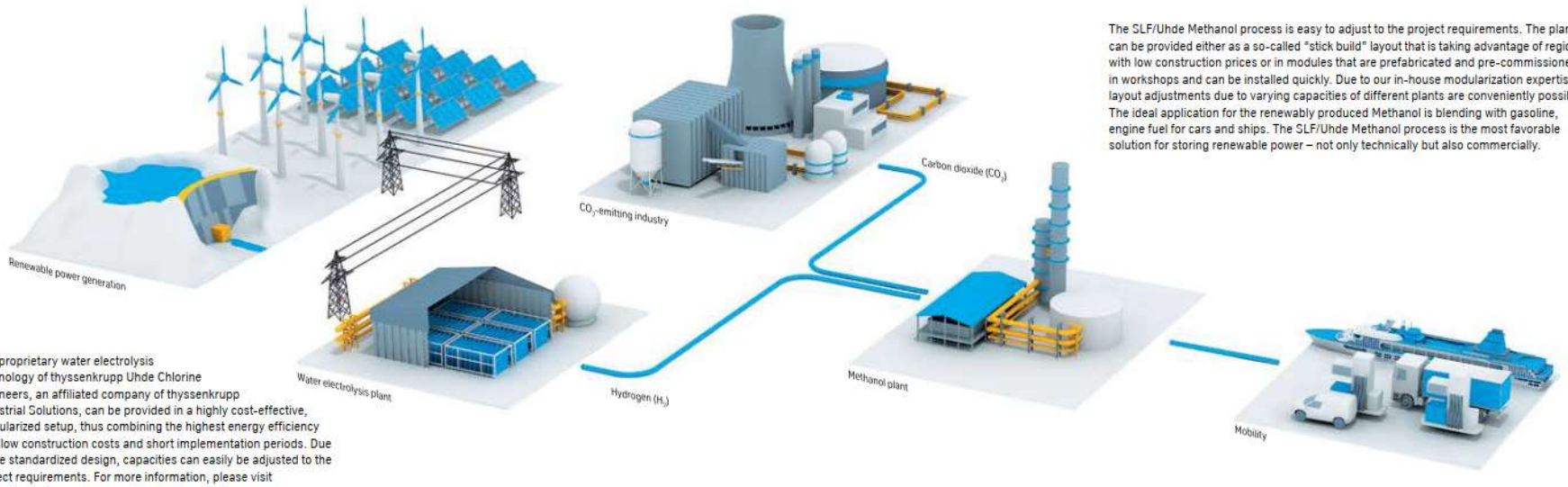
# Green Methanol Plant Production (Thyssenkrupp)




The proprietary water electrolysis technology of thyssenkrupp Uhde Chlorine Engineers, an affiliated company of thyssenkrupp Industrial Solutions, can be provided in a highly cost-effective, modularized setup, thus combining the highest energy efficiency with low construction costs and short implementation periods. Due to the standardized design, capacities can easily be adjusted to the project requirements. For more information, please visit https://www.thyssenkrupp-uhde-chlorine-engineers.com.

The SLF/Uhde Methanol process is easy to adjust to the project requirements. The plant can be provided either as a so-called "stick build" layout that is taking advantage of regions with low construction prices or in modules that are prefabricated and pre-commissioned in workshops and can be installed quickly. Due to our in-house modularization expertise, layout adjustments due to varying capacities of different plants are conveniently possible. The ideal application for the renewably produced Methanol is blending with gasoline, engine fuel for cars and ships. The SLF/Uhde Methanol process is the most favorable solution for storing renewable power – not only technically but also commercially.



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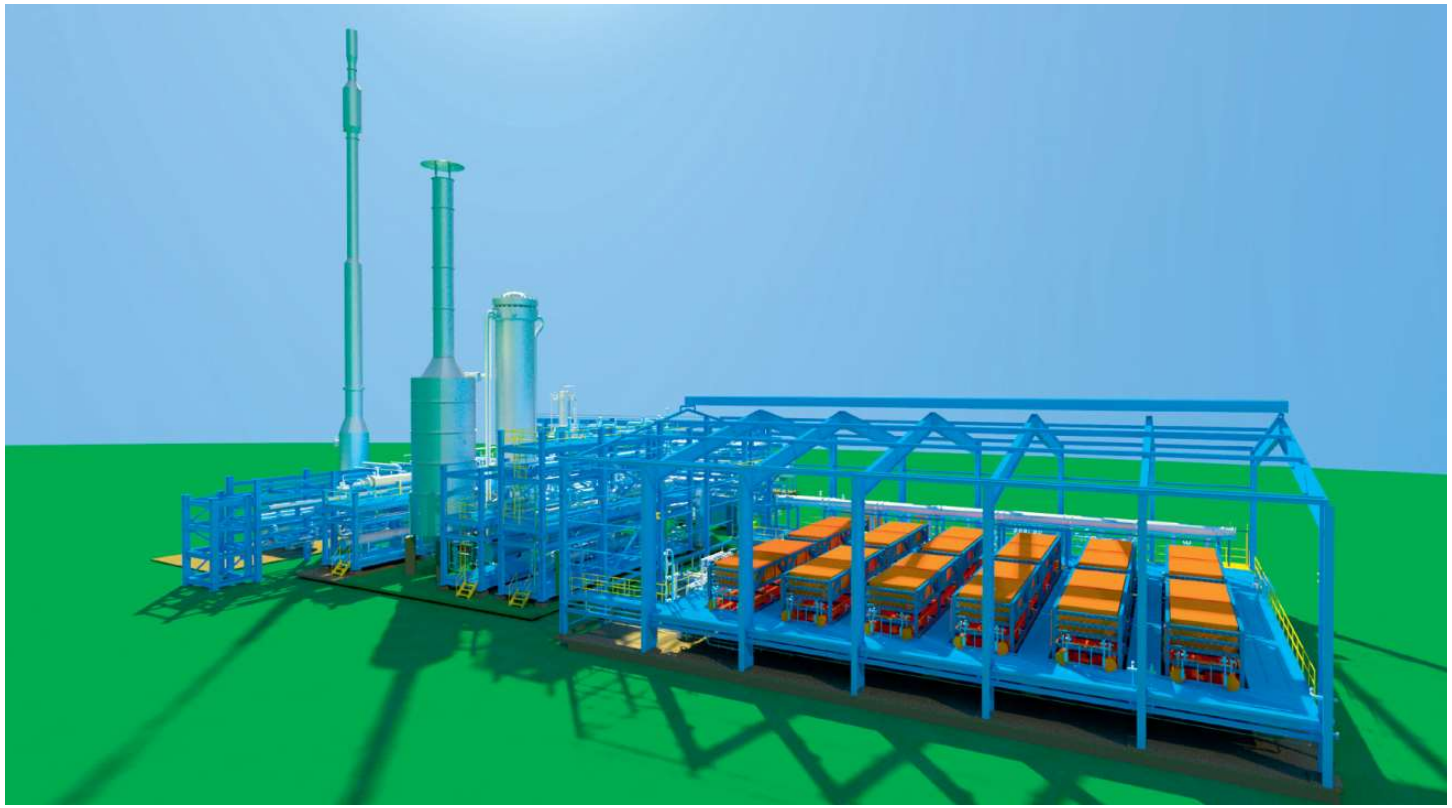
# Green Ammonia Plant Production (Thyssenkrupp)





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# Green Hydrogen Adoption

- Green Methanol : 32 $US/GJ (grey at 20 $US/GJ)
- Green Ammonia from Green Hydrogen with Nitrogen ~ 1,300 $US/T (grey at 900 $US/T)
- Green Hydrogen Cost 5 $US/kg = 40 $US/GJ based on electricity input at 6 cents/kWh.
  (for Reference Natural gas at 5$/GJ)
- Price to decrease to 1.5 $US/kg through project scale and product improvement and lower cost of renewables (at ~ 1.5 cents/kWh) in 2030.
- Then Green Methanol, Ammonia, Hydrogen will compete with Grey Methanol, Ammonia and Natural Gas for 2030



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# Thank You

For more information
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